

NINE NEW SPECIES OF *ANILOCRA* (CRUSTACEA: ISOPODA: CYMOTHOIDAE) EXTERNAL PARASITES OF WEST INDIAN CORAL REEF FISHES

Lucy Bunkley Williams and Ernest H. Williams, Jr.

Abstract.—Nine new species of *Anilocra* are described: *A. haemuli* from *Haemulon flavolineatum*, *H. aurolineatum*, *H. carbonarium*, *H. chrysar-gyreum*, *H. macrostomum*, *H. plumieri*, *H. sciurus*, *Epinephelus cruentatus*, *E. fulvus*, *E. guttatus*, and *Paranthias furcifer*; *A. holocentri* from *Holocentrus ascensionis*; *A. myripristis* from *Myripristis jacobus*; *A. acanthuri* from *Acanthurus chirurgus*, and *A. bahianus*; *A. chromis* from *Chromis multilineatus* and *C. cyaneus*; *A. abudedefdufi* from *Abudedefduf saxatilis*; *A. holacanthi* from *Holacanthus tricolor*; *A. chaetodontis* from *Chaetodon capistratus*, *C. ocellatus*, *C. sedentarius*, and *C. striatus*; and *A. partiti* from *Pomacentrus partitus*.

Anilocra laticauda Milne Edwards, 1840 and *A. leachii* Schioedte, 1866 are declared nomina dubia. The Martinique and Peru specimens of *A. laevis* are shown to represent 2 species: *A. haemuli* and *A. laevis*, respectively. A table distinguishing the species of genus *Anilocra* in the Caribbean Sea is included.

Introduction

Six species in the genus *Anilocra* Leach, 1818, have been described from the New World, *A. laticauda* Milne Edwards, 1840; *A. mexicana* Saussure, 1857; *A. laevis* Miers, 1877; *A. plebeia* Schioedte and Meinert, 1881; *A. acuta* Richardson, 1910; and *A. meridionalis* Richardson, 1914. Schioedte and Meinert (1881) synonymized *A. mexicana* Saussure and *A. laticauda* Milne Edwards; and Trilles (1975) suggested *A. laevis* Miers was a synonym of *A. laticauda*. Various other authors, summarized by Trilles and Vala (1975), have reported *Anilocra laticauda* from members of 11 families of marine fishes in the Caribbean Sea. Hochberg and Ellis (1972) and Williams and Williams (1977) have suggested that other species of *Anilocra* occur in the Caribbean. In the present study 1379 specimens of isopods in the genus *Anilocra* from the West Indies were examined (1198 were collected by the authors from 823 fishes) and separated into 9 species based on the characters listed in Table 1.

Materials and Methods

Host fishes were individually collected with multiprong and conventional spears, quinaldine fish relaxant, or handheld nets and lights at night, using

SCUBA and skin-diving techniques. Hosts were placed immediately into individual plastic bags and held in a mesh diving bag until moved to the laboratory (usually within 2 hours of capture). Isopods were removed, hosts were measured to the nearest millimeter, weighed to the nearest 0.1 gram and damage noted. Isopods were measured alive (total length and width) using slight pressure on the dorsal surface to straighten any curling, and preserved in 70% ethanol. Mouthparts and appendages were mounted in glycerine jelly. Whole isopods were photographed with a Nikon F2 camera with 55 mm Micro-Nikkor lens; an extension tube, and a 2× tele-converter were added to photograph some males. Drawings of the whole animal, dorsal and lateral views, were made from projections of these photographs. Telsons of the illustrated species were drawn in a natural or somewhat depressed position; therefore, the length of telsons in the dorsal views do not represent the actual total lengths. Total lengths of the telsons may be obtained by referring to the lateral views. Mouthparts and appendages were drawn with the aid of a Bausch & Lomb Tri-simplex micro-projector. Underwater photographs are by the senior author unless otherwise noted.

Comparative material included specimens from the National Museum of Natural History (USNM), the Rosenstiel School of Marine and Atmospheric Sciences, University of Miami (UMML); the Muséum National d'Histoire Naturelle, Paris (MNHN); the British Museum of Natural History (BMNH); Gulf Coast Research Laboratory (GCRL); Naturhistoriska Riksmuseet, Stockholm (NR); Museum of Comparative Zoology, Harvard (MCZ); Zoologisches Museum, Humbolt-Universität, Berlin (ZMB); and Florida Atlantic University, vertebrate collection (FAU).

All measurements are in millimeters unless otherwise noted. Lengths of fish hosts are standard lengths in millimeters. Descriptions of isopods are made from specimens from the type-host only. Only materials personally collected or examined by the authors are used for the host and locality data of each species of *Anilocra*. All data are those of the authors unless otherwise noted. Additional biological information concerning these isopods will be reported elsewhere.

Anilocra haemuli, new species

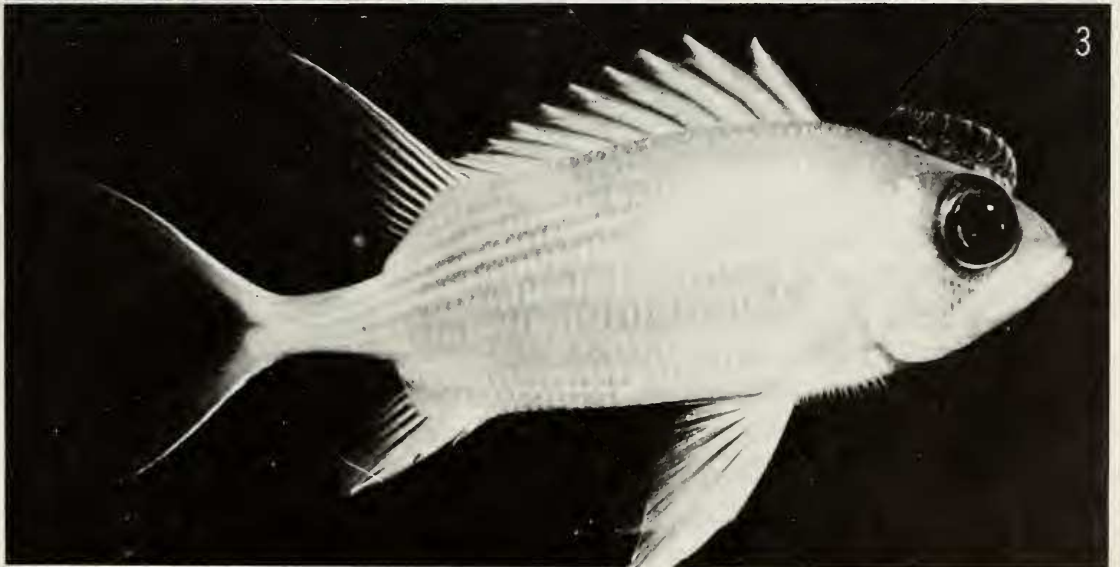
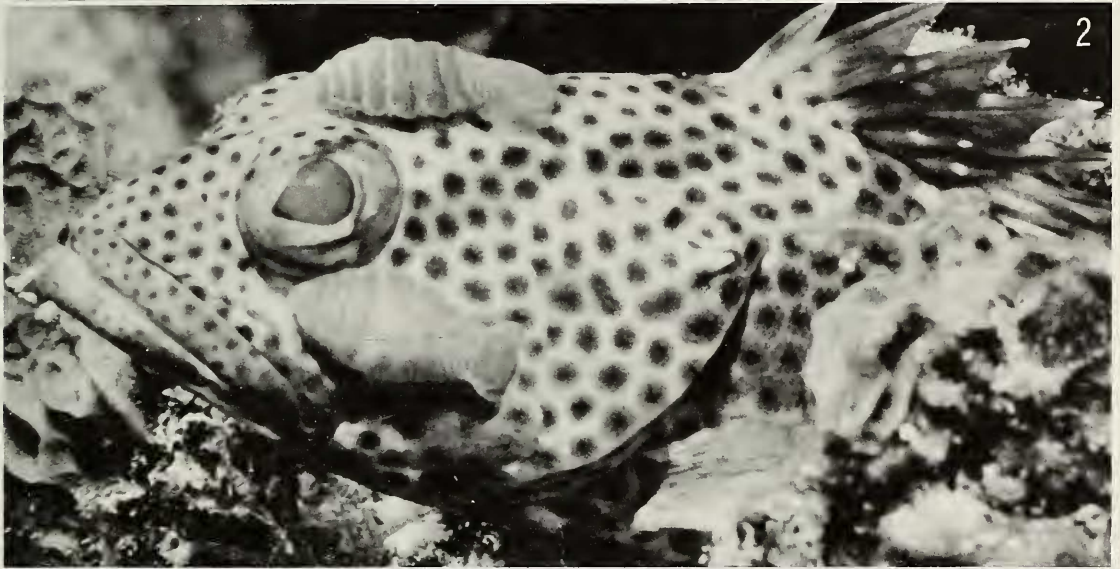
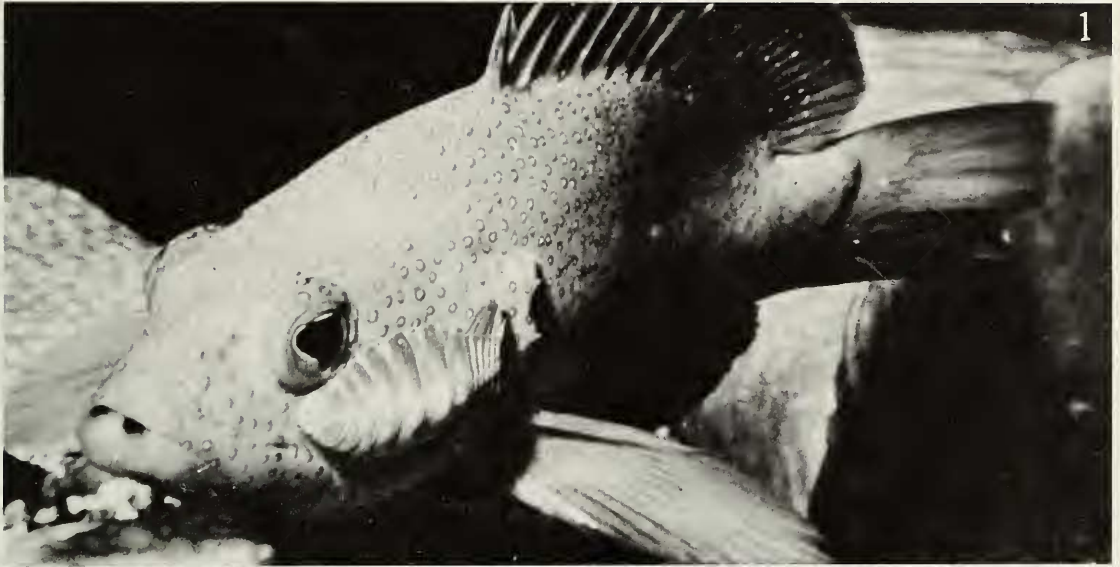
Figs. 1, 2, 4, 5, 271

Anilocra laevis Miers, 1877: 672–673, Martinique specimen only.

Anilocra laticauda.—Boone, 1921:95, in part; Bowman and Díaz-Ungría,

→

Figs. 1–3. ♀ *Anilocra* spp. on their host fishes: 1, *A. haemuli* on the coney, *Epinephelus fulvus*; 2, *A. haemuli* above and below eye of a redhind, *Epinephelus guttatus* (photograph by Herb Taylor); 3, *A. holocentri* on the squirrelfish, *Holocentrus ascensionis*.



1957:112; Burnett-Herkes, 1975:124; Dowgiallo, 1979:35; Hochberg and Ellis, 1972:84, in part; Nierstrasz, 1915:79; Richardson, 1912:190, in part; Schioedte and Meinert, 1881:126; Trilles, 1975:306, in part; Trilles and Vala, 1975:967; Williams, E. and Williams, L., 1977:14; Williams, L. and Williams, E., 1977:15; Williams and Williams, 1978:28.

Isopods examined.—356 (225 females with a marsupium, 31 mature females without a marsupium, 74 immature females, 3 transitionals, and 23 males or juveniles).

Type-host and locality (date).—French grunt, *Haemulon flavolineatum* (Desmarest), La Parguera, Puerto Rico (August 1975 to August 1979).

Location.—Female attached beneath eye of host (Fig. 1). Immature females or transitionals attached adjacent to females, or beneath eye when adult females were not present. Males attached under adult females.

Type-specimens.—Holotype (female) USNM # 184796; allotype (male) USNM # 184797; 8 paratypes USNM # 184798–184805; 10 paratypes in author's collection.

Additional hosts and localities (date).—*Haemulon flavolineatum*, Puerto Rico, Morrillito near Caja de Muertos (20 November 1975), off Punta Cadena (21 July 1976), Culebra Island, southeast coast (11 March 1978), north coast (15 April 1978); St. John, U.S. Virgin Islands, Lameshure Bay (15 September 1970, USNM Acc. No. 294746; 2 March 1977), Europa Bay (16 February 1959, UMML 5109); St. Thomas, U.S. Virgin Islands, Mingo Cay (4 March 1977); Virgin Gorda, British Virgin Islands, The Baths (22 November 1975); Mosquito Island, British Virgin Islands, North tip of Colquhoun Reef (24–25 November 1975); Florida, U.S.A., Monroe County, ½ mi. SSW of Alligator Reef Light (30 April 1961, UMML CRR-F-296). Tomtate, *Haemulon aurolineatum* Cuvier, Puerto Rico, La Parguera (9 December 1975; 24 January, 7 April, 2 September, 20 October, 30 November, 4 December 1976; 22, 29 January, 17–18 February; 3, 26 March, 4 April 1977; 20 January, 18–19 March 1978); Morrillito near Caja de Muertos (20 November 1975); Jamaica, Montego Bay (10 July 1910, USNM 41797; 23 July 1910, USNM 41799). Smallmouth grunt, *Haemulon chrysargyreum* Günther, Puerto Rico, La Parguera (9 November 1975; 27 January, 13 July 1976; 28 January, 2 May 1977); St. John, U.S. Virgin Islands, Eagle Shoals (3 March 1977). Caesar grunt, *Haemulon carbonarium* Poey, Puerto Rico, Culebra Island, north coast (15 April 1978); St. John, U.S. Virgin Islands, Eagle Shoals (3 March 1977). Spanish grunt, *Haemulon macrostomum* Günther, Puerto Rico, La Parguera (17 December 1976). White grunt, *Haemulon plumieri* (Lacépède), Mexico, Cozumel, Yucatán (27 January 1885, USNM); Florida, U.S.A., Key West (9 October 1922, USNM; 8 December 1922, USNM), Dade County, Yellow Reef at Margot Fish Shoal (20 June 1961, UMML; 28 June 1963, UMML), Boca Chita Pass (3 August 1963, UMML).

Bluestripe grunt, *Haemulon sciurus* (Shaw), Florida, U.S.A., Miami, Rickenbacker Causeway (20 March 1948, UMML 32.307). Cora cora, *Orthopristis ruber* (Cuvier and Valenciennes), Venezuela, Isla de Margarita (19 September 1973, USNM 144032–144034). Coney, *Epinephelus fulvus* (Linnaeus), Puerto Rico, La Parguera (10 December 1976), Mona Island (14 April, 14 November 1975; 19–23 April 1976; 25 May 1977); St. John, U.S. Virgin Islands, Lameshure Bay (2 March 1977); St. Thomas, U.S. Virgin Islands, Buck Island (5 March 1977); St. Croix, U.S. Virgin Islands, Cane Bay (6, 8 March 1977), Fredericksted (9 March 1977); Dominican Republic, south coast, Bahía de Caldera (24 November 1978); Bahama Islands, Chub Cay (6 June 1976), Cat Island (8 June 1976), Crooked Island (12 June 1976), Long Island (14–15 June 1976), Great Inagua (17 April 1977), Aklins Island (21–22 April 1977), Long Cay (23 April 1977) Gum Cay (1 January 1964, UMML); Guadeloupe (12 September 1973, IS-493, MNHN). Red hind, *Epinephelus guttatus* (Linnaeus), Puerto Rico, La Parguera (1 November, 9 December 1975; 18 October 1976; 27–29 January, 5 February, 18 May 1977; 10 October 1978; 15 February 1979), Ensenada (1 February 1979); St. John, U.S. Virgin Islands, Lameshure Bay (9 November 1958, UMML 4991; 25 July, 13, 16, 18 September 1970, USNM Acc. No. 294746; 2 March 1977), Cabritte Horn Point (UMML 226, 100); St. Thomas, U.S. Virgin Islands, Buck Island (5 March 1977); Anegada, British Virgin Islands, White Horse Key (24 November 1975). Graysby, *Epinephelus cruentatus* (Lacépède), St. John, U.S. Virgin Islands, Riddle Bay (23 January 1959, UMML 4992); Dominican Republic, south coast, Bahía de Caldera (24 November 1978); Bahama Islands, Exuma Island (11 July 1959, UMML, WAS-BWI-10), Rum Cay (10 June 1976). Creole-fish, *Paranthias furcifer* (Valenciennes), Puerto Rico, Desecheo Island (28 February, 22 October 1975; 22 July 1976; 22–23 May 1977), Mona Island (14 April 1975; 22 April 1976), Monito Island (22 April 1976); Dominican Republic, south coast, Bahía de Caldero (24 November 1978); Colombia, South America, Punta Aguja (14 October 1977), Punta de Betín (12 October 1977). No Host Indicated—Jamaica, Montego Bay (6 August 1910, USNM; 7 July 1910, USNM; 29 June 1910, USNM 41796; Cuba, Cape Cajon (15 May 1914, USNM 53837); Havana (MCZ); Cuba (ZMB 4047, 4048) (1914, IS-482 MNHN); Brazil, Río de Janeiro (USNM); Barbados, near Pelican Island (14 May 1918, USNM); St. Croix, U.S. Virgin Islands (February 1894, USNM 33078), Cane Bay (July 1937, USNM 222), Christiansted (USNM 86348); St. Thomas, U.S. Virgin Islands (IS-294, IS-492 MNHN; MCZ 3151, 3152), Buck Island (30 July 1915, USNM 79302); Puerto Rico (1898–1899, USNM 44280); Dominica, B. W. I. (8 June 1964, USNM 112666–112667); Florida, U.S.A., Key West (15–27 April 1884, USNM; 11 December 1922, USNM; 9 May 1919, USNM; 19 May 1918, USNM; MCZ 3150); Upper Jewfish Bush Lake (30 January 1903, USNM 44263); Venezuela, Isla Cubagua, Punta de Piedras (31 October

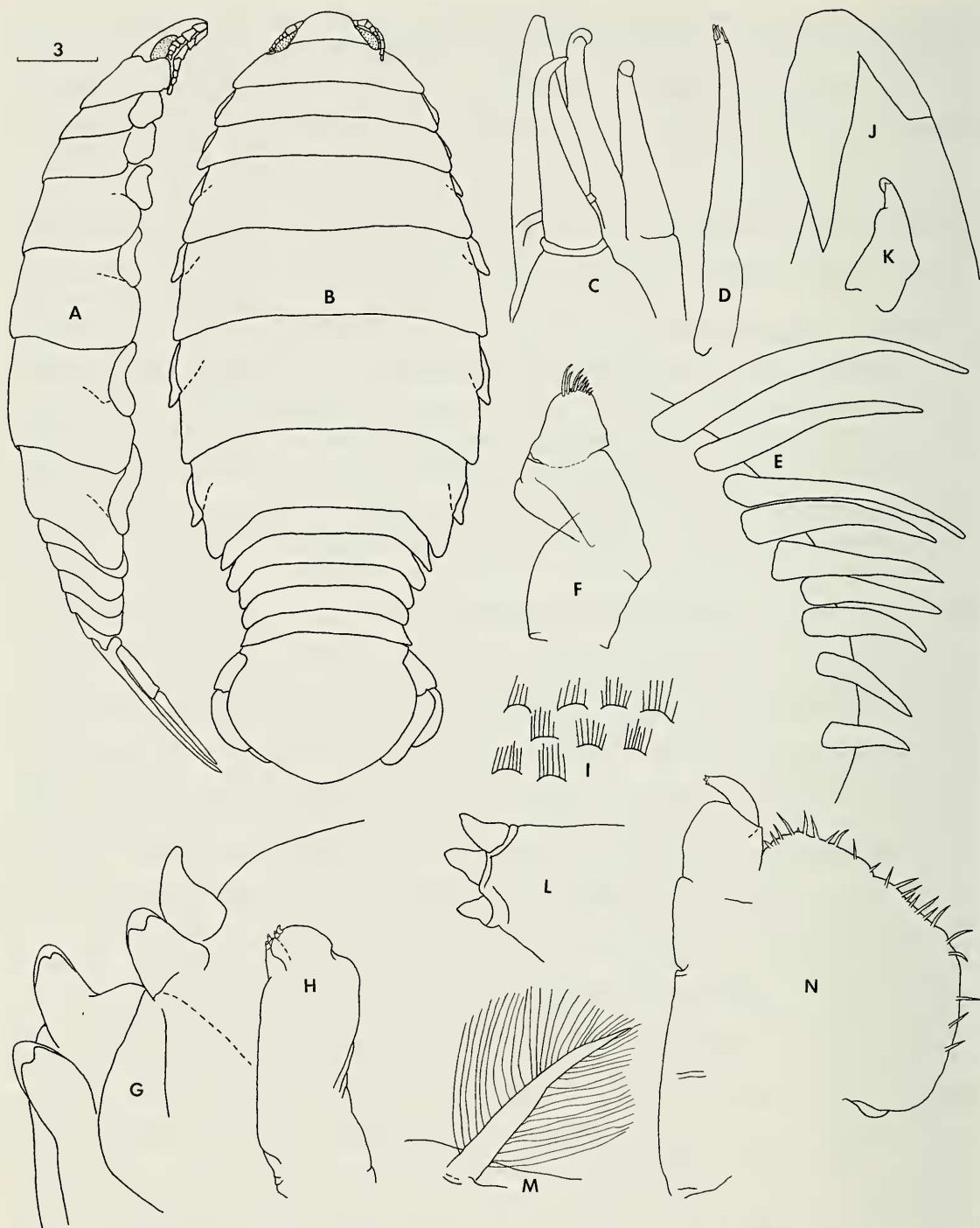


Fig. 4. *Anilocra haemuli*, ♀ with marsupium: A, Lateral view; B, Dorsal view; C, Apex of maxilla 1; D, Maxilla 1; E, Apex of distal segment of mandibular palp; F, Mandibular palp; G, Distal lobes of maxilla 2; H, maxilla 2; I, Scales on maxilla 2; J, Apex of body of mandible; K, Body of mandible; L, Apex of palp of maxilliped; M, Seta from margin of maxilliped; N, Maxilliped. Mouthparts 29 \times , enlarged details of mouthparts 363 \times . Scale in mm.



Fig. 5. *Anilocra haemuli*. A–D, ♀ with marsupium: A, Pereopod 1, 10×; B, Pereopod 7, 10×; C, Left uropod, 10×; D, Frons and left antennae. E–M, ♂: E, Dorsal view; F, Pereopod 1; G, Pereopod 6; H, Pereopod 7; I, Left uropod; J, Natatory seta from uropod; K, Sensory seta from pleopod 2; L, Coupling seta from pleopod 2; M, Pleopod 2; N, Dactyl of ♀ pereopod 2, 10×. ♂ pereopod, uropod and pleopod 44×; setae 371×. Scales in mm.

1967, USNM 122768), Punta Araya, Gulf of Cariaco (USNM 107091); Martinique (Chafanjon, 1873–1884, IS-421 MNHN); Antillen (ZMB 3004); no locality (ZMB 4958).

Diagnosis.—Anterior margin of head truncate, flexed and produced into lobe between bases of antennae 1. Posteroventral angle of pereonite 6 slightly produced, of pereonite 7 produced, that of pereonite 7 overlapping pleonite 1. Shortest pereonite 2, longest 6. Body axis distorted less than 5°. Telson

as wide as long to $\frac{1}{6}$ wider than long. Pereopods 2–4 without swelling on outer margin of dactyl. Dactylus of pereopod 7 shorter than propodus. Uropod not reaching posterior margin of telson. Endopod of uropod extending beyond posterior end of exopod.

Further details.—Body oval, length-width ratio 2.5 (2.1–2.9). Head width-length ratio 2.1 (1.6–2.5). Antennae 1 8-merous. Antennae 2 9–10-merous, reaching from $\frac{2}{3}$ length to posterior edge of pereonite 1. Distance between eyes 47% (42–51%) of head width. Distal segment of mandibular palp with 5–10 simple setae, second segment with or without setae. Pleotelson sub-circular, posterior margin obtusely pointed. Color of body yellow to light brown in life; upper lateral surface (when attached to host) noticeably more pigmented.

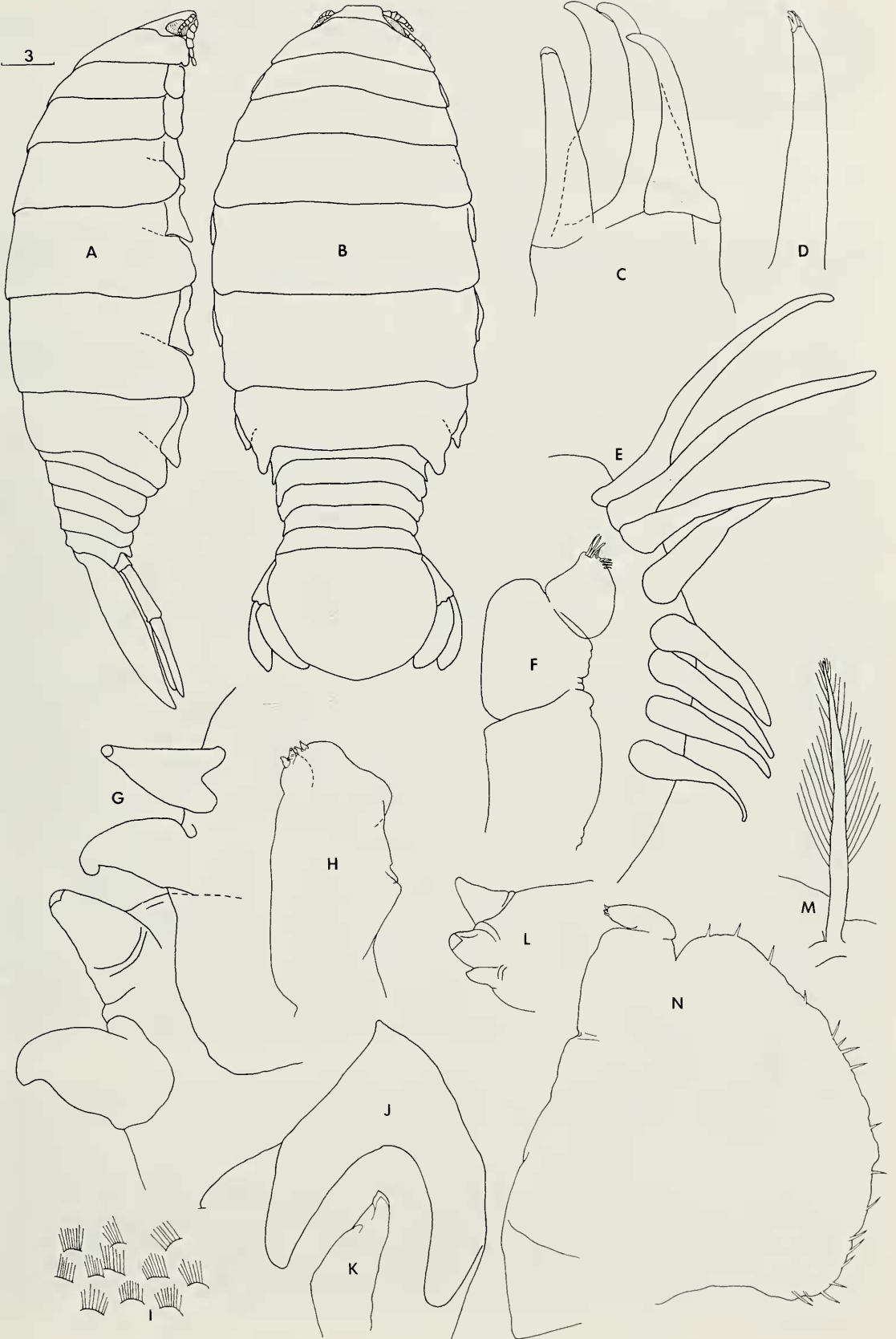
Penis lobes of male separate. Appendix masculina of male pleopod 2 linear, with unmodified apex. Basis of pleopod 2 with 2 sensory and 4 coupling setae. Fifty-five females with oostegites were 21–40 long (mean 29.9); 8–15 wide (mean 11.7). Three females lacking oostegites were 29–34 long (mean 31.6); 11–13 wide (mean 12). Twelve immature females were 21–32 long (mean 28); 8–14 wide (mean 11.4). One transitional was 10 long, 3 wide; lacked appendix masculina and penis lobes. One male was 7 long, 2 wide; with pereopod 7 fully developed. Three juveniles were 4 long, 1 wide; with pereopod 7 reduced; appendix masculina reduced.

Remarks.—Seventy-five *Anilocra haemuli* were collected on 67 *Haemulon flavolineatum* 88–184 (mean 122) long; 30 on 22 *H. aurolineatum* 103–154 (mean 133.8) long; 8 on 7 *H. chrysargyreum* 123–158 (mean 147.6) long; 3 on 2 *H. carbonarium* 162–175 (mean 168.5) long; 1 on 1 *H. macrostomum* 115 long; 26 on 22 *Epinephelus guttatus* 143–279 (mean 181.3) long; 41 on 29 *Paranthias furcifer* 121–213 (mean 162.8) long; 72 on 55 *Epinephelus fulvus* 86–235 (mean 171.3) long; and 5 on 3 *Epinephelus cruentatus* 135–142 (mean 138.7) long.

This parasite was attached in the subocular region (Fig. 1) with 2 exceptions: a single female isopod was attached above the eye of a *Haemulon flavolineatum* (off Punta Cadena, Puerto Rico, 21 July 1976); and 1 female was attached above the eye of an *Epinephelus guttatus* which had additional female specimens attached below each eye (Fig. 2) (Wallin 1978) (St. Croix, June 1975—Herb Taylor, pers. comm.). The isopod caused slight to moderate damage of the tissue underlying the attachment site; in some cases,

→

Fig. 6. *Anilocra holocentri*, ♀ with marsupium: A, Lateral view; B, Dorsal view; C, Apex of maxilla 1; D, Maxilla 1; E, Apex of distal segment of mandibular palp; F, Mandibular palp; G, Distal lobes of maxilla 2; H, maxilla 2; I, Scales on maxilla 2; J, Apex of body of mandible; K, Body of Mandible; L, Apex of palp of maxilliped; M, Seta from margin of maxilliped; N, Maxilliped. Mouthparts 29×, enlarged details of mouthparts 363×. Scale in mm.



bone deformation was observed. Often, on the *Haemulon* spp., the area of attachment of the parasite was pigmented with an orange color like that in the mouths of these fishes.

The name is taken from the genus of the type-host.

Anilocra holocentri, new species

Figs. 3, 6, 7, 27C

Anilocra laticauda.—Menzies and Glynn, 1968:46; Moore, 1902:172, in part.
Anilocra sp.—Collette and Talbot, 1972:111; Hochberg and Ellis, 1972:84, in part; Williams and Williams, 1977:15, in part.

Isopods examined.—52 (28 females with a marsupium, 5 mature females without a marsupium, 9 immature females, 1 transitional and 9 males).

Type-host and locality (date).—Squirrelfish, *Holocentrus ascensionis* (Osbeck), La Parguera, Puerto Rico (August 1976–February 1977).

Location.—Female attached in the interorbital region of the head (Fig. 3). Immature female or transitional usually attached anterior to female on the upper lip of the host or interorbitally when no adult female was present.

Type-specimens.—Holotype (female) USNM # 184813; allotype (male) USNM # 184814; 8 paratypes USNM # 184815–184822; 10 paratypes in authors' collection.

Additional hosts and localities (date).—*Holocentrus ascensionis*, La Parguera (24 February 1959, USNM 107833; 11 August 1964, USNM), west coast, Punta Cadena (21 July 1976), Corcega (8 February 1976), Aguadilla, Crashboat Pier (3 January 1976), Las Coronas (23 July 1976); St. John, U.S. Virgin Islands, Lameshure Bay (9 November 1958, UMML 4737 Voss Ref. No. 32, 2263; 2 August and 15 September 1970, USNM Acc. No. 294746; 2 March 1977), Europa Bay (16 February 1959, UMML 5110 Aquis. No. 226-100); St. Thomas, U.S. Virgin Islands, east end of Congo Cay (3 March 1977), Buck Island (5 March 1977). No Host Indicated.—Puerto Rico, Vieques Island (8 February 1899, USNM 32655); St. Thomas, U.S. Virgin Islands (February and April 1935, USNM 86371; MCZ 3151); St. Croix, U.S. Virgin Islands (ZMB 25667); Sandy Point, Patagonia, Strait of Magellan (March 1872, MCZ 3153).

Diagnosis.—Anterior margin of head truncate, flexed and produced into lobe between bases of antennae 1. Posteroventral angle of pereonite 7 slightly produced, that of pereonite 7 overlapping pleonite 1. Shortest pereonite 2, longest 6. Body axis distorted less than 5°. Telson as wide as long to $\frac{2}{5}$ wider than long. Pereopods 2–4 without swelling on outer margin of dactyl. Dactylus of pereopod 7 shorter than propodus. Uropod not reaching posterior margin of telson. Endopod of uropod extending beyond posterior end of exopod.

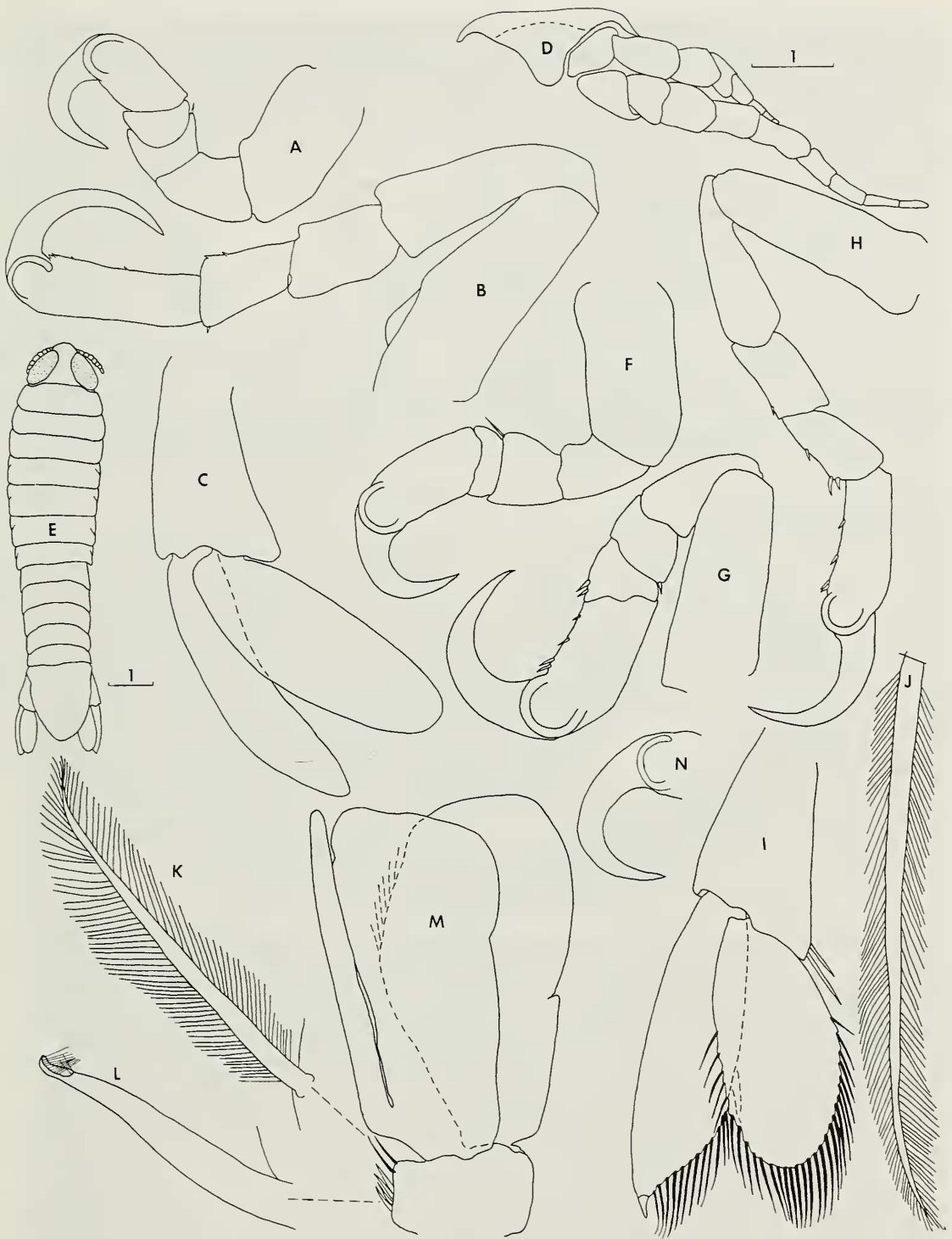


Fig. 7. *Anilocra holocentri*. A-D, ♀ with marsupium: A, Pereopod 1, 10×; B, Pereopod 7, 10×; C, Left uropod, 10×; D, Frons and left antennae. E-M, ♂: E, Dorsal view; F, Pereopod 1; G, Pereopod 6; H, Pereopod 7; I, Left uropod; J, Nataory seta from uropod; K, Sensory seta from pleopod 2; L, Coupling seta from pleopod 2; M, Pleopod 2. N, Dactyl of ♀ pereopod 2, 10×. ♂ pereopods, uropod, and pleopod 44×; setae 371×. Scales in mm.

Further details.—Body elongate oval, length-width ratio 2.7 (2.4–3.1). Head width-length ratio 3.3 (2.7–3.9). Antennae 1 8-merous. Antennae 2 9–10-merous, reaching from $\frac{1}{2}$ length to almost posterior edge of pereonite 1. Distance between eyes 49% (46–53%) of head width. Distal segment of mandibular palp with 7–8 simple setae, second segment with or without setae. Pleotelson heart-shaped to round. Color of dorsal surface of body dark brown, ventral light brown in life.

Penis lobes of male separate. Appendix masculina of male pleopod 2 linear, with unmodified apex. Basis of pleopod 2 with 2 sensory and 4 coupling setae. Seventeen females with oostegites were 32–46 long (mean 29); 12–17 wide (mean 14.5). Four females lacking oostegites were 36–41 long (mean 39); 14–15 wide (mean 14.8). Six immature females were 13–35 long (mean 27.8); 7–13 wide (mean 10.2). One transitional was 13 long, 4 wide; lacked penis lobes, appendix masculina 67% length found in the male. Nine males were 5–9 long (mean 5.9); 1–2 wide (mean 1.3), with pereopod 7 fully developed to absent.

Remarks.—Thirty-seven *Anilocra holocentri* were collected from 28 *Holocentrus ascensionis* length 120–203 (mean 159.4). Some erosion of scales and loss of pigment occurred in the area of isopod attachment. The immature females or transitionals usually attached anterior to the female on the upper lip of the host. In Florida, a “squirrel fish” was photographed with a female attached between the eyes and a male or transitional attached beneath 1 eye (Chess 1975).

The name is taken from the genus of the host.

Anilocra myripristis, new species

Figs. 8, 11, 12, 27B

Anilocra sp.—Colin, 1978:336, in part; Williams and Williams, 1977:15, in part.

“Isopod”—Böhlke and Chaplin, 1968:153.

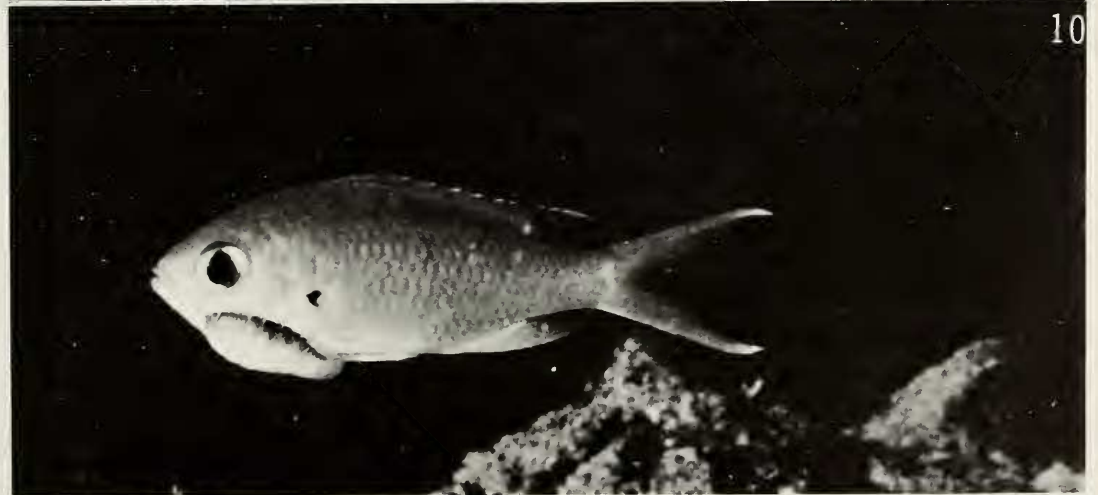
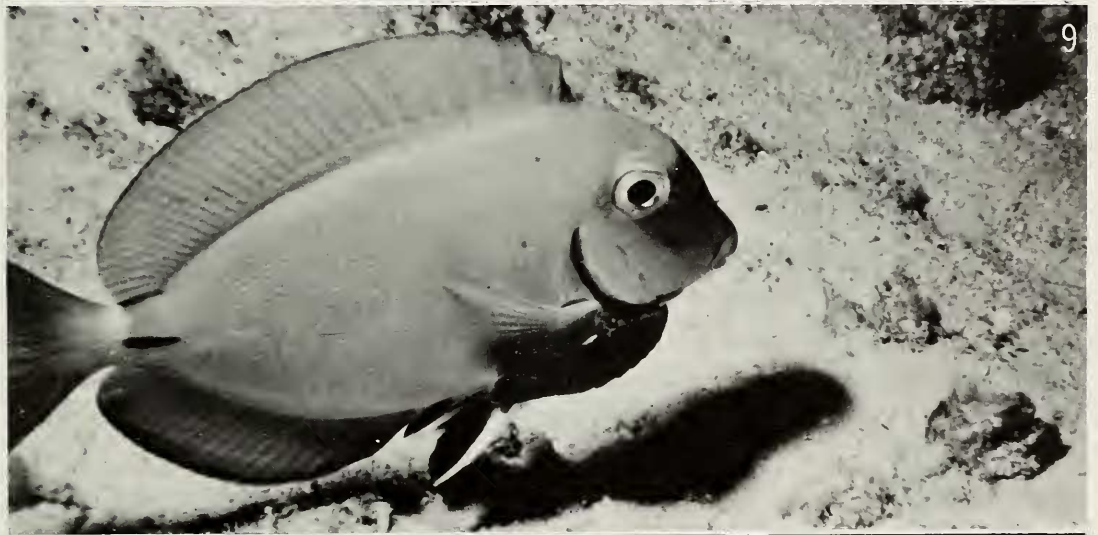
Isopods examined.—35 (19 females with a marsupium, 12 immature females, 1 transitional, and 3 males).

Type-host and locality (date).—Blackbar soldierfish, *Myripristis jacobus* Cuvier, Mona Island, Puerto Rico (April 1975–November 1980).

Location.—Female attached in the interorbital region of the head (Fig. 8). Immature female or transitional usually attached beneath eye, or interorbitally when no adult female present.

Type-specimens.—Holotype (female) USNM # 184823; allotype (male) USNM # 184824; 8 paratypes USNM # 184825–184832; 10 paratypes in authors' collection.

Additional localities (date).—Dominican Republic, south coast, La Caleta (23 November 1978), Bahía de Caldero (24 November 1978); Bahama Is-



Figs. 8-10. ♀ *Anilocra* spp. on their host fishes: 8, *A. myripristis* on the blackbar soldierfish, *Myripristis jacobus*; 9, *A. acanthuri* on the ocean surgeon, *Acanthurus bahianus*; 10, *A. chromis* on the brown chromis, *Chromis multilineatus*.

lands, New Providence Island (11 April 1955, UMML Neg. No. 444-449), Green Cay (21 July 1957, UMML Chaplin Collections; 14 May 1959, USNM 119497), San Salvador, Grahams Harbor (9, 11 June 1968, Ex II 68-5, 9, FAU), Cat Island (8 June 1976), Little Inagua (18 April 1977).

Diagnosis.—Anterior margin of head truncate, flexed and produced into lobe between bases of antennae 1. Posteroventral angle of pereonite 6 slightly produced, of pereonite 7 produced, that of pereonite 7 overlapping pleonite 1. Shortest pereonite 2, longest 6. Body axis distorted less than 5°. Telson $\frac{1}{10}$ more narrow to $\frac{1}{10}$ wider than long. Pereopods 2–4 without swelling on outer margin of dactyl. Dactylus of pereopod 7 shorter than propodus. Uropod extending beyond posterior margin of telson. Endopod of uropod extending beyond posterior end of exopod.

Further details.—Body elongate oval, length-width ratio 2.7 (2.3–3.1). Head width-length ratio 2.3 (2.0–2.7). Antennae 1 8-merous. Antennae 2 8–10-merous, reaching from $\frac{2}{3}$ to $\frac{3}{4}$ length of pereonite 1. Distance between eyes 45% (35–49%) of head width. Distal segment of mandibular palp with 5–10 simple setae, second segment with or without setae, pleotelson square. Color of dorsal surface of body light redish-brown, ventral yellow in life.

Penis lobes of male separate. Appendix masculina of male pleopod 2 linear, with unmodified apex. Basis of pleopod 2 with 1 sensory and 4 coupling setae. Fifteen females with oostegites were 29–40 long (mean 34.8); 10–15 wide (mean 13.1). Nine immature females were 18–31 long (mean 26.3); 6–12 wide (mean 9.4). One transitional was 9 long, 2.5 wide; lacked penis lobes, appendix masculina not reduced. Three males were 6–7 long (mean 6.7); 1–2.5 wide (mean 1.5); with pereopod 7 reduced to fully developed.

Remarks.—Twenty-eight *Anilocra myripristis* were collected from 23 *Myripristis jacobus*, length 99–164 (mean 125.7). Some erosion of scales and loss of pigment occurred in the area of isopod attachment.

The name is taken from the genus of the host.

Anilocra acanthuri, new species

Figs. 9, 13, 14, 27A

Anilocra laticauda.—Bowman, Grabe, and Hecht, 1977:392; Richardson, 1912:190, in part; Trilles, 1975:306, in part.

Anilocra sp.—Williams and Williams, 1977:15, in part.

Isopods examined.—245 (75 females with a marsupium, 14 mature females without a marsupium, 70 immature females, 14 transitionals, and 72 males).

Type-host and locality (date).—Doctorfish, *Acanthurus chirurgus* (Bloch), La Parguera, Puerto Rico (April 1975–December 1978).

Location.—Female attached beneath and slightly anterior to the base of



Fig. 11. *Anilocra myripristis*, ♀ with marsupium: A, Lateral view; B, Dorsal view; C, Apex of maxilla 1; D, Maxilla 1; E, Apex of distal segment of mandibular palp; F, Mandibular palp; G, Distal lobes of maxilla 2; H, Maxilla 2; I, Scales from maxilla 2; J, Apex of body of mandible; K, Body of mandible; L, Apex of palp of maxilliped; M, Seta from margin of maxilliped; N, Maxilliped. Mouthparts 29×, enlarged details of mouthparts 363×. Scale in mm.

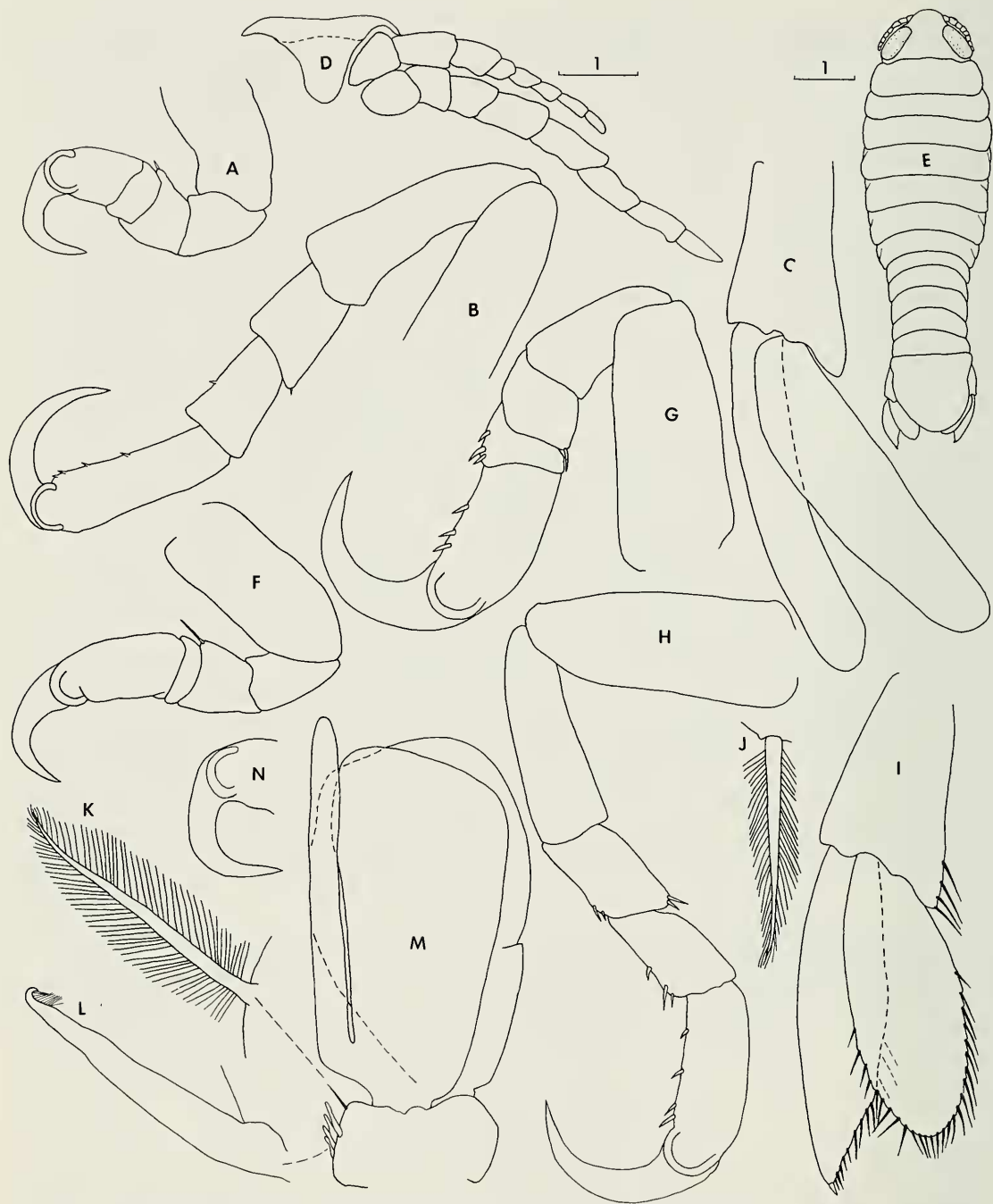


Fig. 12. *Anilocra myripristis*. A-D, ♀ with marsupium: A, Pereopod 1, 10×; B, Pereopod 7, 10×; C, Left uropod, 10×; D, Frons and left antennae. E-M, ♂: E, Dorsal view; F, Pereopod 1; G, Pereopod 6; H, Pereopod 7; I, Left uropod; J, Natatory seta from uropod; K, Sensory seta from pleopod 2; L, Coupling seta from pleopod 2; M, Pleopod 2. N, Dactyl of ♀ pereopod 2, 10×. ♂ pereopods, uropod, and pleopod 44×; setae 371×. Scales in mm.

the pectoral fin (Fig. 9). Transitionals were attached to the inner surfaces of the pectoral or pelvic fins, on the body near the female, or in the "female" position when no female was present; males were attached to the inner surfaces of the pectoral or pelvic fins.



Fig. 13. *Anilocra acanthuri*, ♀ with marsupium: A, Lateral view; B, Dorsal view; C, Apex of maxilla 1; D, Maxilla 1; E, Apex of distal segment of mandibular palp; F, Mandibular palp; G, Distal lobes of maxilla 2; H, Maxilla 2; I, Scales on maxilla 2; J, Apex of body of mandible; K, Body of mandible; L, Apex of palp of maxilliped; M, Seta from margin of maxilliped; N, Maxilliped. Mouthparts 29×, enlarged details of mouthparts 363×. Scale in mm.

Type-specimens.—Holotype (female) USNM # 184767; allotype (male) USNM # 184768; 8 paratypes, USNM # 184769–184775; 10 paratypes in authors' collection.

Additional hosts and localities (date).—*Acanthurus chirurgus*, Puerto Rico, Corsega, north of Punta Cadena (6 February 1976), Las Coronas, south of Puerto Real (23 July 1976), Culebra Island, northeast coast (16

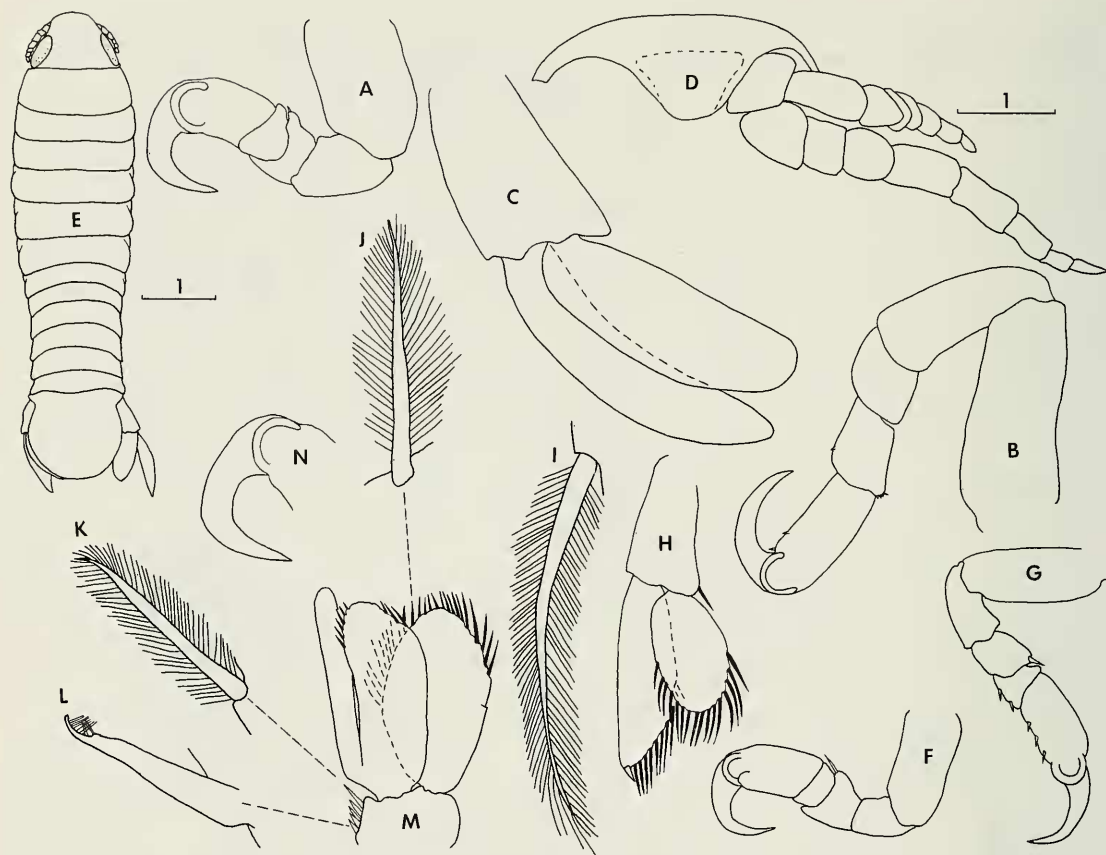


Fig. 14. *Anilocra acanthuri*. A-D, ♀ with marsupium: A, Pereopod 1, 10×; B, Pereopod 7, 10×; C, Left uropod, 10×; D, Frons and left antennae. E-M, ♂: E, Dorsal view; F, Pereopod 1; G, Pereopod 6; H, Left uropod; I, Natatory seta from uropod; J, Seta from exopod of pleopod 2; K, Sensory seta from pleopod 2; L, Coupling seta from pleopod 2; M, Pleopod 2. N, Dactyl of ♀ pereopod 2, 10×. ♂ pereopods, uropod, and pleopod 44×, setae 371×. Scales in mm.

April 1978), northwest part of Culebrita (11 March 1978); St. John, U.S. Virgin Islands, Lameshure Bay (21 December 1958, UMML 4989; 2 March 1977); St. Thomas, U.S. Virgin Islands, near Congo Cay (4 March 1977), Buck Island (5 March 1977); Anegada, British Virgin Islands, White Horse Key (24 November 1975); Bahama Islands, Bimini (3 July 1957, USNM 101838), Long Island (15 June 1976); Florida, U.S.A., Dade County, Bache Shoal (9 October 1958, UMML 4252, CRR-F 162, Neg. No. 392-5, and Voss Ref. No. 32,2262) Dade County, Long Reef (8 December 1959, UMML), Yellow Reef (28 June 1963, UMML), Tortugas (July and August 1930, USNM 97648, Manter No. 572; 29 June 1931, USNM 68372), Soldier Key (26 August 1954, USNM). Ocean surgeon, *Acanthurus bahianus*, Castelnau, Puerto Rico, Mona Island (14-15 November 1975; 19-23 April 1976; 26 May 1977); Dominican Republic, south coast, La Caleta (23 November 1978); Bahama Islands, Cat Island (8 June 1976), Conception Island (9 June 1976), Crooked Island (11-12 June 1976), Long Island (12-15 June,

1976), Aklins Island (21–22 April 1977), Long Cay (23 April 1977). No Host Indicated.—Puerto Rico, Piñeros Island, Roosevelt Roads Naval Station (21 March 1953, USNM 98185), Cabeza de Perro (16 March 1953, USNM 98184); St. Thomas, U.S. Virgin Islands (MNHN); Florida, Tortugas (USNM 97690, Carnegie Inst. No. 144662); Jamaica, Montego Bay (24 June 1910, USNM 41798); Cuba (ZMB 4048).

Diagnosis.—Anterior margin of head truncate, flexed and produced into lobe between bases of antennae 1. Posteroventral angles of pereonites not produced, that of pereonite 7 overlapping no pleonite. Shortest pereonite 2, longest 6. Body axis distorted less than 5° . Telson $1/10$ to $2/5$ wider than long. Pereopods 2–4 without swelling on outer margin of dactyl. Dactylus of pereopod 7 shorter than propodus. Uropod not reaching posterior margin of telson. Endopod of uropod not reaching the posterior end of exopod to extending beyond end of exopod.

Further details.—Body elongate oval, length-width ratio 2.9 (2.5–3.3). Head width-length ratio 2.2 (1.6–2.6). Antennae 1 8-merous. Antennae 2 8–10-merous, reaching from $1/2$ length to beyond posterior edge of pereonite 1. Distance between eyes 65% (53–74%) of head width. Distal segment of mandibular palp with 5–12 simple setae, second segment with or without setae. Pleotelson oval. Color of dorsal surface of body black to lead-gray, ventral gray, in life.

Penis lobes of male separate. Appendix masculina of male pleopod 2 linear, with unmodified apex. Basis of pleopod 2 with 1 sensory and 4 coupling setae. Thirty-six females with oostegites were 29–40 long (mean 34.4); 9–14 wide (mean 12.0). Six females lacking oostegites were 35–40 long (mean 37); 11–13 wide (mean 12.5). Fifty-three immature females were 10–34 long (mean 20.1); 2–11 wide (mean 6). Ten transitionals were 7–10 long (mean 8.8); 1.5–3.0 wide (mean 2.2). Forty-nine males were 4–8 long (mean 5); 1–2 wide (mean 1.2), with pereopod 7 absent to fully developed.

Remarks.—One hundred fifty-four *Anilocra acanthuri* were collected on 74 *Acanthurus chirurgus* 58–211 (mean 139.3) long and 72 on 45 *Acanthurus bahianus* 106–178 (mean 136.9) long. Some erosion of scales occurred in the area of isopod attachment. The isopods from *A. bahianus* were slightly longer (32–43) and wider (11–15) than those from the type host, and the coxae were slightly longer.

Acanthurus chirurgus was frequently parasitized by another cymothoid isopod, *Agarna cumulus* (Haller), in the gill chamber. Of the 73 fish parasitized by *Anilocra acanthuri*, 38 were also parasitized by *Agarna cumulus*. In addition, of 214 fish collected without *Anilocra acanthuri*, 17 were parasitized by *Agarna cumulus*.

A specimen of *A. acanthuri* (USNM 101838) recorded from the blue tang, *Acanthurus coeruleus* Schneider, traced to the original field notes of the collector, was actually collected from *Acanthurus hepatus* (= *A. chirurgus*).

The name is taken from the genus of the host.

Anilocra chromis, new species

Figs. 10, 15, 16, 27G

Anilocra laticauda.—Boone, 1927:139, in part.

Anilocra sp.—Colin, 1978:337, in part; Hochberg and Ellis, 1972:84, in part; Smith and Tyler, 1972:153; Williams and Williams, 1977:15, in part.

Isopods examined.—301 (185 females with a marsupium, 20 mature females without a marsupium, 47 immature females, 28 transitionals, and 21 males).

Type-host and locality (date).—Brown chromis, *Chromis multilineatus* (Guichenot), La Parguera, Puerto Rico (August 1975–June 1978).

Location.—Attached beneath eye of host (Fig. 10).

Type-specimens.—Holotype (female) USNM # 184786; allotype (male) USNM # 184787; 8 paratypes USNM # 184788–184795; 10 paratypes in authors' collection.

Additional hosts and localities (date).—*Chromis multilineatus*, Puerto Rico, west coast, off Punta Cadena (21 July 1976), Corsega (6–8 February 1976), channel buoy off Añasco River (1 March 1975), Mona Island (13 April, 15–16 November 1975; 21 April 1976), Vieques Island (21 November 1975), Culebra Island (10 March, 18 April 1978), Congrejos (21 May 1956, USNM 101832); St. John, U.S. Virgin Islands, Lameshure Bay (21 December 1958, UMML Ref. No. 32,2264, 32,2267, 32,2268; 2 March 1977); St. Croix, U.S. Virgin Islands near Butler Bay (7 March 1977); Virgin Gorda, British Virgin Islands, The Baths (22 November 1975); Anegada, British Virgin Islands, White Horse Key (23–24 November 1975); Mosquito Island, British Virgin Islands (25 November 1975). Blue chromis, *Chromis cyaneus* (Poey); Dominican Republic, south coast, La Caleta (23 November 1978); Bahama Islands, Chub Cay (6 June 1976), Eleuthra (7 June 1976), Cat Island (8 June 1976), Conception Island (9 June 1976; 24 April 1977), Rum Cay (10 June 1976), Long Island (12–15 June 1976), Carrion Crow Harbor Reefs (14 November 1958, UMML Ref. No. 32,2265), Indian Cay (16 July 1959, UMML Neg. No. 450-453). No Host Indicated.—Anguila, British West Indies (17 July 1965, USNM Acc. No. 292647); Bahama Islands, Green Cay (14 May 1959, USNM 119497).

Diagnosis.—Anterior margin of head truncate, flexed and produced into lobe between bases of antennae 1. Posteroventral angles of pereonites not produced, that of pereonite 7 overlapping no pleonite. Shortest pereonite 2, longest 6. Body axis distorted less than 5°. Telson $1/10$ more narrow to $1/10$ wider than long. Pereopods 2–4 without swelling on outer margin of dactyl. Dactylus of pereopod 7 shorter than propodus. Uropod extending beyond posterior margin of telson. Endopod of uropod not reaching posterior end of exopod.



Fig. 15. *Anilocra chromis*, ♀ with marsupium: A, Lateral view; B, Dorsal view; C, Apex of maxilla 1; D, Maxilla 1; E, Apex of distal segment of mandibular palp; F, Mandibular palp; G, Distal lobes of maxilla 2; H, Maxilla 2; I, Scales on maxilla 2; J, Apex of body of mandible; K, Body of mandible; L, Apex of palp of maxilliped; M, Seta from margin of maxilliped; N, Maxilliped. Mouthparts 29×, enlarged details of mouthparts 363×. Scale in mm.

Further details.—Body oval, length-width ratio 2.6 (2.3–3.4). Head width-length ratio 2.2 (1.7–2.4). Antennae 1 8-merous. Antennae 2 9–10-merous, reaching from $\frac{1}{3}$ to full length of pereonite 1. Distance between eyes 52% (45–63%) of head width. Distal segment of mandibular palp with 4–7 simple setae, second segment with or without setae. Pleotelson shield-shaped. Color of dorsal surface of body dark gray and off white, in life. Upper lateral surface (when attached to host) countershaded $\frac{1}{4}$ to $\frac{2}{3}$ width of body, dark gray, the remainder of dorsal and all ventral off-white. Basis of pereopods on dark side, dark gray.

Penis lobes of male separate. Appendix masculina of male pleopod 2 linear, with unmodified apex. Basis of pleopod 2 with 1 sensory and 4 coupling setae. One hundred thirty-two females with oostegites were 16–28 long

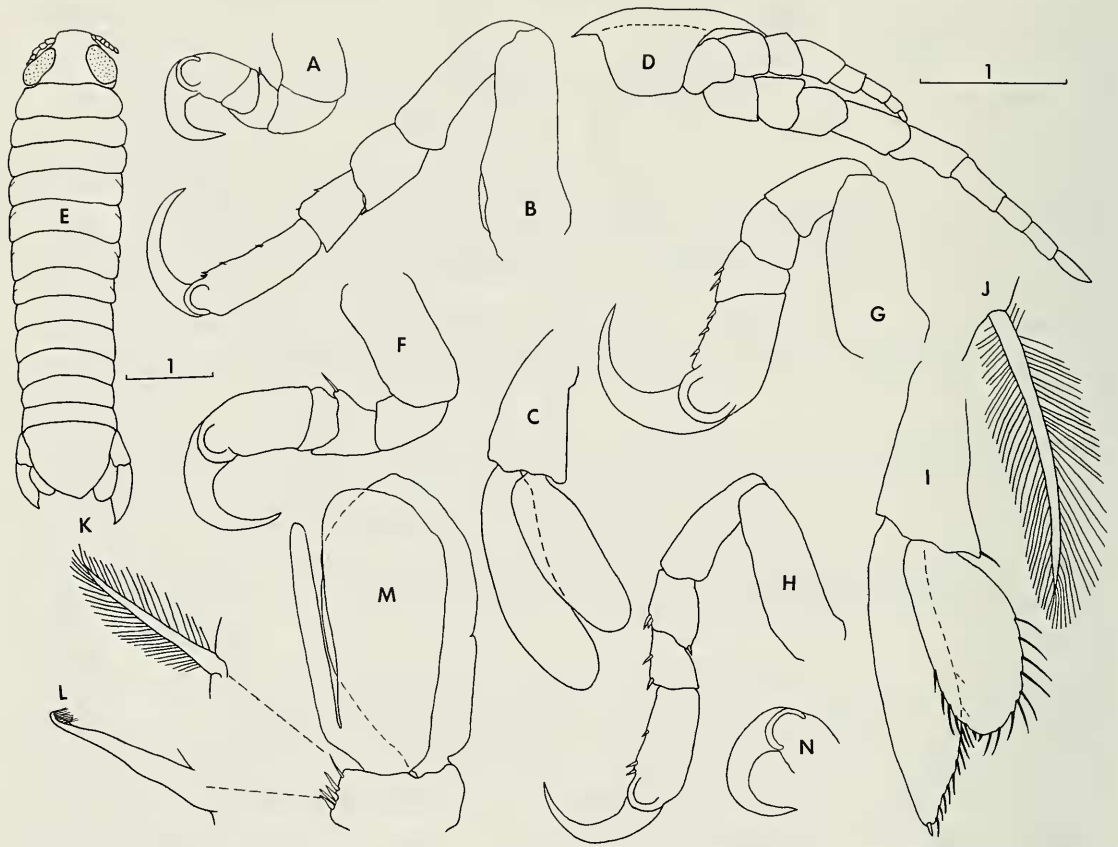


Fig. 16. *Anilocra chromis*. A-D, ♀ with marsupium: A, Pereopod 1, 10×; B, Pereopod 7, 10×; C, Left uropod, 10×; D, Frons and left antennae. E-M, ♂: E, Dorsal view; F, Pereopod 1; G, Pereopod 6; H, Pereopod 7; I, Left uropod; J, Natatory seta from uropod; K, Sensory seta from pleopod 2; L, Coupling seta from pleopod 2; M, Pleopod 2. N, Dactyl of ♀ pereopod 2, 10×. ♂ pereopod, uropod, and pleopod 44×, setae 371×. Scales in mm.

(mean 23.4); 6–12 wide (mean 9.1). Twenty females lacking oostegites were 20–25 long (mean 22); 8–10 wide (mean 8.6). Twenty-six immature females were 8–22 long (mean 16.5); 3–9 wide (mean 6). Sixteen transitionals were 8–16 long (mean 12.7); 2–6 wide (mean 3.9); lacking penis lobes; appendix masculina 25 to 67% of the length found in the male. Twelve males 4–9 long (mean 6.8); 1–2 wide (mean 1.6); with pereopod 7 absent to fully developed.

Remarks.—Two hundred six *Anilocra chromis* were collected on 186 *Chromis multilineatus*, length 42–122 (mean 79.4); and 78 on 68 *Chromis cyaneus*, length 18–78 (mean 50.9). The parasite was usually attached in the subocular region (Fig. 10). It was observed once (by the authors, 8 November 1978, submerged reef, east of Turumote Reef, La Parguera; not collected) attached above the eye with no other *Anilocra chromis* present. Erosion of scales occurred in the region of isopod attachment. Female isopods with oostegites collected from *Chromis cyaneus* were slightly smaller, length 14–26 (mean 19), than those collected on *C. multilineatus*.

The name is taken from the genus of the hosts.

Anilocra abudefdufi, new species

Figs. 17, 19, 27H

Anilocra laticauda.—Boone, 1921:95, in part.

Isopods examined.—77 (48 females with a marsupium, 4 mature females without a marsupium, 13 immature females, 7 transitionals, 2 males, and 3 juveniles).

Type-host and locality (date).—Sergeant major, *Abudefduf saxatilis* (Linnaeus), Nalunega, San Blas Islands, Panama (25–30 October 1980).

Location.—Attached beneath eye of the host (Fig. 17).

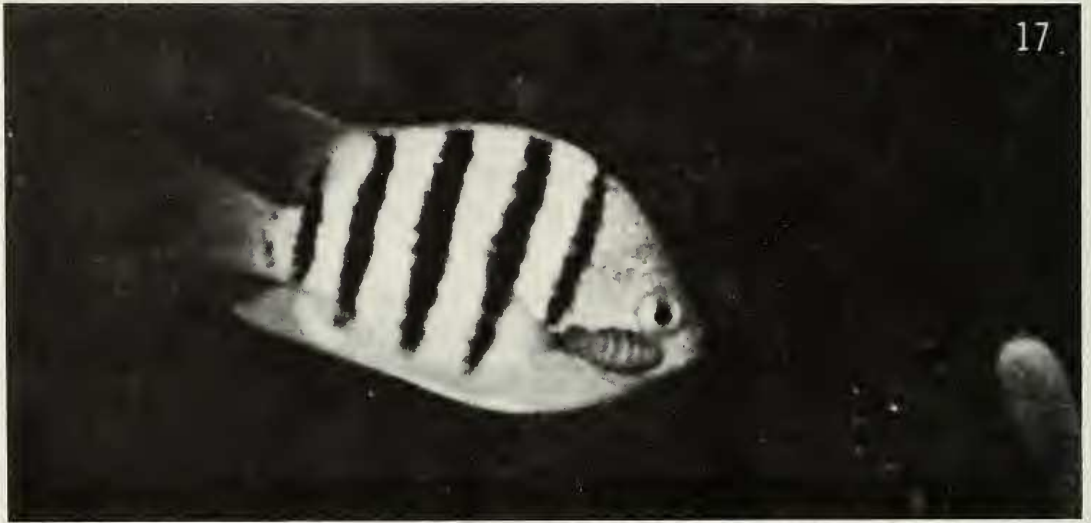
Type-specimens.—Holotype (female) USNM # 184758; 9 paratypes USNM # 184759–184766; 41 paratypes in author's collection.

Additional hosts and localities (date).—*Abudefduf saxatilis*, Panama, Colon Reef (2 May 1911, USNM 43772), Torro Point (19 May 1911, USNM 43773), Ft. Randolph, Limón Bay (17 January 1978, GCRL, POD 121), San Blas Islands near Porvenir Island (January 1979, Dr. John Cubit, Coll.) Isla Arena and Isla del Rosario, near Cartagena, Colombia, S.A. (30 March 1978, Carol Sanner, Coll.). No Host Indicated.—Panama, Fort Sherman, Limón Bay, Colon (24 April 1972, Dawson 1542, GCRL), María Chiquita, Colon (27 April 1972, Dawson 1544, GCRL), Galeta Island, Colon (29 April 1972, Dawson 1546; 17 November 1972, Dawson 1601, GCRL), Devils Beach, Colon (16 November 1972, Dawson 1600, GCRL), Ft. Randolph, Limón Bay, Colon (13 November 1972, Dawson 1596; 7 March 1974, Dawson 1691, GCRL).

Diagnosis.—Anterior margin of head truncate, flexed and produced into lobe between bases of antennae 1. Posteroventral angle of pereonite 6 slightly produced, of pereonite 7 produced, that of pereonite 7 overlapping pleonite 1. Shortest pereonite 2, longest 6. Body axis distorted less than 5°. Telson $\frac{1}{10}$ more narrow to $\frac{1}{5}$ wider than long. Pereopods 2–4 with swelling on outer margin of dactyl. Dactylus of pereopod 7 shorter than propodus. Uropod not reaching posterior margin of telson to extending beyond posterior margin of telson. Endopod of uropod not reaching posterior end of exopod to extending beyond end of exopod.

Further details.—Body oval, length-width ratio 2.5 (2.2–2.9). Head width-length ratio 2.8 (2.3–3.4). Antennae 1 8-merous. Antennae 2 9–11-merous, reaching from $\frac{2}{3}$ length to beyond posterior edge of pereonite 1. Distance between eyes 52% (47–63%) of head width. Distal segment of mandibular palp with 10–11 simple setae, second segment with or without setae. Pleotelson broadly rounded. Color of dorsal surface of body dark brown, countershaded to light brown to yellow. Upper lateral surface (when attached to host) countershaded $\frac{1}{2}$ to $\frac{3}{4}$ width of body, dark brown, the remainder of dorsal and all ventral, light brown to yellow. Pereopods of dark side often dark brown.

Forty-six females with oostegites were 19–31 long (mean 26.4); 7.5–13.5



Figs. 17, 18. ♀ *Anilocra* spp. on their host fishes: 17, *A. abundefdufi* on the sergeant major, *Abudefduf saxatilis*; 18, *A. holacanthi* on the rock beauty, *Holacanthus tricolor*.

wide (mean 11.1). Four females without oostegites were 23–24.1 long (mean 23.7); 9.5–11 wide (mean 10.3). Thirteen immature females were 13–24 long (mean 18.2); 4–10 wide (mean 6.2). Seven transitionals were 7.8–11 long (mean 10.2); 2–3.5 wide (mean 2.8); lacked penis lobes, appendix masculina 25 to 50% length found in male. Two males were 7–8.5 long and 2 wide. Three juveniles were 4–4.5 long and 1 wide.

Remarks.—Fifty-one *Anilocra abundefdufi* were collected from 32 *Abudefduf saxatilis*, length 50–108 (mean 92.6); also 14 *Anilocra abundefdufi* were collected (by Carol Sanner and Dr. John Cubit) from 10 *Abudefduf*



Fig. 19. *Anilocra abudefdufi*, ♀ with marsupium: A, Lateral view; B, Dorsal view; C, Apex of maxilla 1; D, Maxilla 1; E, Apex of distal segment of mandibular palp; F, Mandibular palp; G, Distal lobes of maxilla 2; H, Maxilla 2; I, Scales on maxilla 2; J, Apex of body of mandible; K, Body of mandible; L, Apex of palp of maxilliped; M, Seta from margin of maxilliped; N, Maxilliped; O, Pereopod 1; P, Pereopod 7; Q, Left uropod; R, Frons and left antennae; S, Dactyl of pereopod 2. Mouthparts 29×, enlarged details of mouthparts 363×, pereopods and uropod 10×. Scales in mm.

saxatilis, length 80–125 (mean 99.4), and 10 *Anilocra abudefdufi* were collected (by Dr. C. E. Dawson) without host data.

The name is taken from the genus of the host.

Anilocra holacanthi, new species

Figs. 18, 20, 21, 27F

Anilocra laticauda.—Boone, 1930:16 (?); Hochberg and Ellis, 1972:84, in part.

Anilocra sp.—Williams and Williams, 1977:15, in part.

Isopods examined.—113 (58 females with a marsupium, 9 mature females without a marsupium, 23 immature females, 3 transitionals, and 20 males.

Type-host and locality (date).—Rock beauty, *Holacanthus tricolor* (Bloch), La Parguera, Puerto Rico (September 1975–February 1977).

Location.—Female attached beneath eye of the host (Fig. 18). Transitionals and males attached adjacent to the female, or beneath the eye when no female was present.

Type-specimens.—Holotype (female) USNM # 184806; allotype (male) USNM # 184807; 8 paratypes USNM # 184808–184812; 10 paratypes in authors' collection.

Additional hosts and localities (date).—Puerto Rico, west coast, Corsega (6 February 1976), Morrillito, near Caja de Muertos (20 November 1975), Desecheo Island (22 July 1976; 22–23 May 1977), Monito Island (22 April 1976), Mona Island (14–15 November 1975; 20–23 April 1976); St. John, U.S. Virgin Islands, Lameshure Bay (18 September 1970, USNM Acc. No. 294746; 2 March 1977); Virgin Gorda, British Virgin Islands, The Baths (22 November 1975); Dominican Republic, south coast, La Caleta (23 November 1978); Bahama Islands, Eleuthra (7 June 1976), Cat Island (8 June 1976), Conception Island (9 June 1976), Fowl Cay (13–14 June 1976), Long Island (15 June 1976); Jamaica, Discovery Bay (7 January 1980). No Host Indicated.—St. Thomas, U.S. Virgin Islands (MCZ 3151); no locality (NR 4956, 4957, 4959).

Diagnosis.—Anterior margin of head truncate, flexed and produced into lobe between bases of antennae 1. Posteroventral angle of pereonites 5–6 slightly produced, of pereonite 7 produced, that of pereonite 7 overlapping pleonite 1. Shortest pereonite 2, longest 6. Body axis distorted more than 10°. Telson as wide as long to $\frac{1}{3}$ wider than long. Pereopods 2–4 with swelling on outer margin of dactyl. Dactylus of pereopod 7 shorter than propodus. Uropod not reaching posterior margin of telson. Endopod of uropod extending beyond posterior end of exopod.

Further details.—Body expanded oval, length-width ratio 2.2 (1.9–2.6). Head width-length ratio 2.6 (2.2–2.9). Antennae 1 8-merous. Antennae 2 9–10-merous, reaching from $\frac{2}{3}$ length to near posterior edge of pereonite 1.



Fig. 20. *Anilocra holacanthi*, ♀ with marsupium: A, Lateral view; B, Dorsal view; C, Apex of maxilla 1; D, Maxilla 1; E, Apex of distal segment of mandibular palp; F, Mandibular palp; G, Distal lobes of maxilla 2; H, Maxilla 2; I, Scales on maxilla 2; J, Apex of body of mandible; K, Body of mandible; L, Apex of palp of maxilliped; M, Setae from margin of maxilliped; N, Maxilliped. Mouthparts 29×, enlarged details of mouthparts 363×. Scale in mm.

Distance between eyes 54% (49–58%) of head width. Distal segment of mandibular palp with 4–8 simple setae, second segment with or without setae. Pleotelson rectangular. Color of dorsal surface of body black to lead gray, ventral gray, in life.

Penis lobes of male separate. Appendix masculina of male pleopod 2

linear, with unmodified apex. Basis of pleopod 2 with no sensory and 4 coupling setae. Fifty females with oostegites were 21–33 long (mean 26); 9–14 wide (mean 11.9). Nine females lacking oostegites were 23–29 long (mean 25.6); 11–13 wide (mean 11.8). Twenty-three immature females were 11–25 long (mean 20.2); 4–11 wide (mean 8.1). Three transitionals were 11–15 long (mean 12.7); 4–5 wide (mean 4.3); penis lobes present; appendix masculina 10 to 50% of the length present in males. Nineteen males were 4–7 long (mean 4.9); 1–2 wide (mean 1.3); with pereopod 7 absent to fully developed.

Remarks.—One hundred four *Anilocra holacanthi* were collected on 65 *Holacanthus tricolor*, length 52–171 (mean 104.8). Isopods attached in the suborbital region were very conspicuous on the bright yellow face of this host (Fig. 18). Erosion of scales and occasionally erosion of tissue occurred in the area of isopod attachment. Often a dark pigment occurred under the site of attachment. Extensive bone deformation was not observed.

The name is taken from the genus of the host.

Anilocra chaetodontis, new species

Figs. 22, 24, 25, 27E

Anilocra laticauda.—Hochberg and Ellis, 1972:84, in part; Moore, 1902:172, in part.

Anilocra sp.—Williams and Williams, 1977:15, in part.

Isopods examined.—189 (78 females with a marsupium, 10 mature females without a marsupium, 63 immature females, 5 transitional and 33 males).

Type-host and locality (date).—Foureye butterflyfish, *Chaetodon capistratus* Linnaeus, La Parguera, Puerto Rico (September 1974–March 1977).

Location.—Female attached beneath eye of the host (Fig. 22). Transitionals and males attached adjacent to females, or beneath the eye when no females were present.

Type-specimens.—Holotype (female) USNM # 184776; allotype (male) USNM # 184777; 8 paratypes USNM # 184778–184785; 10 paratypes in authors' collection.

Additional hosts and localities (date).—*Chaetodon capistratus*, Puerto Rico, Mona Island (14–15 November 1975; 20 April 1976), Culebra Island, southeast coast (10 March 1978), Morrillito, near Caja de Muertos (20 November 1975); St. John, U.S. Virgin Islands, Lameshure Bay (18 October 1958, UMML; 21 December 1958, UMML 4990, Ref. #32,2266; 16 September 1970, USNM Acc. No. 294746); St. Croix, U.S. Virgin Islands, Cane Bay (8 March 1977); Virgin Gorda, British Virgin Islands, The Baths (22 November 1975); Mosquito Island, British Virgin Islands (25 November 1975); Bahama Islands, Crooked Island (11–12 June 1976), Long Island (12 June 1976), Aklins Island (21–22 April 1977). Banded butterflyfish, *Chaetodon striatus* Linnaeus, Puerto Rico, La Parguera (2 November 1975; 18 August

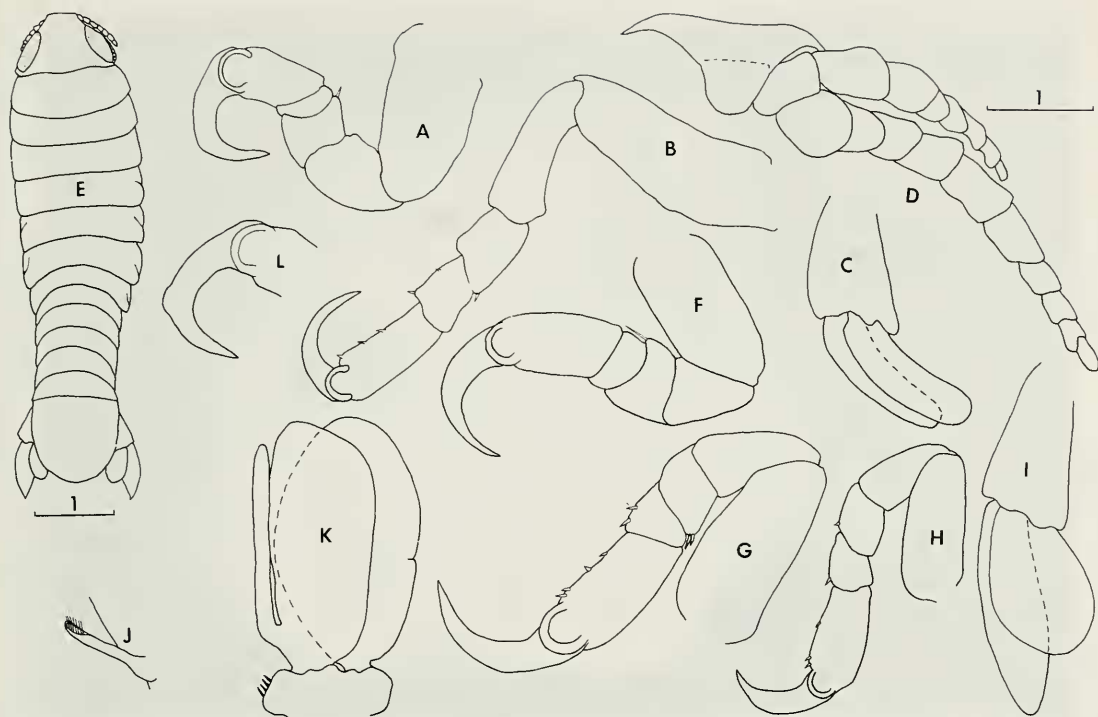
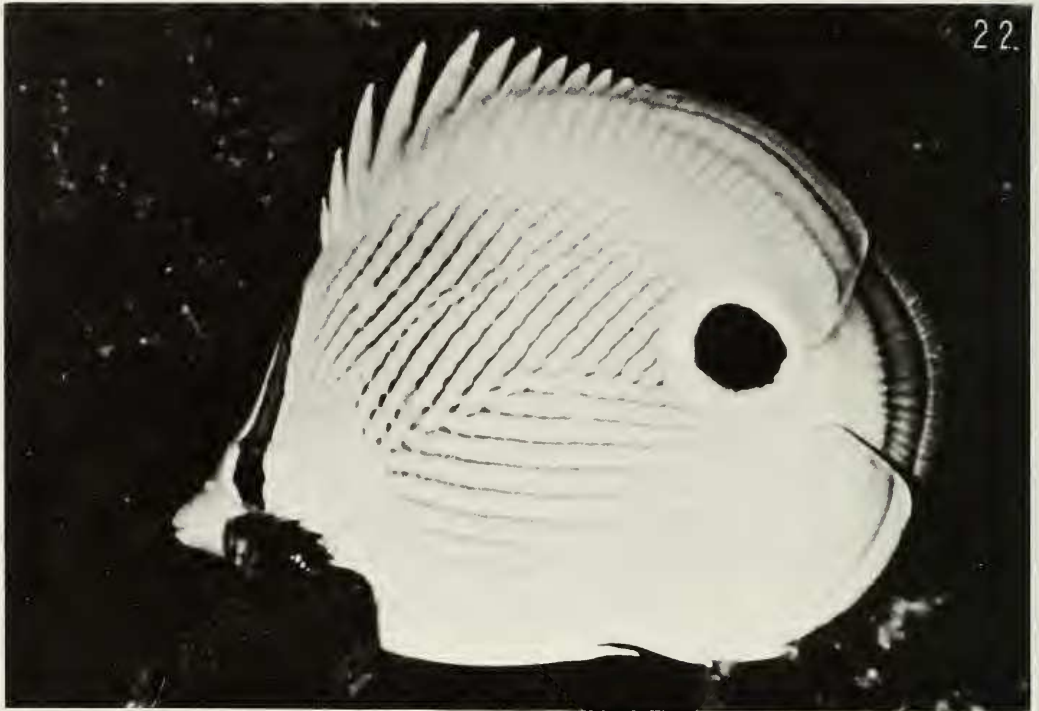


Fig. 21. *Anilocra holacanthi*. A–D, ♀ with marsupium: A, Pereopod 1, B, Pereopod 7, 10×; C, Left uropod, 10×; D, Frons and left antennae. E–M, ♂: E, Dorsal view; F, Pereopod 1; G, Pereopod 6; H, Pereopod 7; I, Left uropod; J, Coupling seta from pleopod 2; K, Pleopod 2. L, Dactyl of ♀ pereopod 2, 10×. ♂ pereopods, uropod, and pleopod 44×, seta 371×. Scales in mm.

1976; 13 June, 7 August 1977), Mona Island (22 April 1976); British Virgin Islands, Anegada, White Horse Key (24 November 1975); Bahama Islands, Great Inagua (16–17 April 1977), Little Inagua (18–19 April 1977). Spotfin butterflyfish, *Chaetodon ocellatus* Bloch, Puerto Rico, La Parguera (16 March, 12 November 1976; 18 February 1977); St. Thomas, U.S. Virgin Islands, Buck Island (5 March 1977); Bahama Islands, Chub Cay (6 June 1976), Bimini (1–7 February 1975, UMML). Reef butterflyfish *Chaetodon sedentarius* Poey, Puerto Rico, La Parguera (17 May, 14, 21 October 1977), Ensenada (16 January 1977). “Chaetodont,” Puerto Rico, Arroyo (5 February 1899, USNM 985). No Host Indicated.—St. Thomas, U.S. Virgin Islands (ZMB 1504); St. Croix, U.S. Virgin Islands (NR 5570).

Diagnosis.—Anterior margin of head truncate, flexed and produced into lobe between bases of antennae 1. Posteroventral angle of pereonite 4 slightly produced, of pereonites 5–7 produced, that of pereonite 7 overlapping pleonite 2. Shortest pereonite 2, longest 6. Body axis distorted less than 5°. Telson as wide as long to $\frac{1}{10}$ wider than long. Pereopods 2–4 with swelling on outer margin of dactyl. Dactylus of pereopod 7 shorter than propodus. Uropod not reaching posterior margin of telson. Endopod of uropod extending beyond posterior end of exopod.



Figs. 22, 23. ♀ *Anilocra* spp. on their host fishes: 22, *A. chaetodontis* on the foureye butterflyfish, *Chaetodon capistratus*; 23, *A. partiti* on the bicolor damselfish, *Pomacentrus partitus*.

Further details.—Body expanded oval, length-width ratio 2.2 (1.9–2.5). Head width-length ratio 2.6 (2–3). Antennae 1 8-merous. Antennae 2 9–10-merous, reaching from $\frac{1}{2}$ to $\frac{2}{3}$ length of pereonite 1. Distance between eyes 53% (47–65%) of head width. Distal segment of mandibular palp with 7–12 simple setae, second segment with or without setae. Pleotelson broadly rounded. Color of dorsal surface of body black to lead gray, ventral gray, in life.



Fig. 24. *Anilocra chaetodontis*, ♀ with marsupium: A, Lateral view; B, Dorsal view; C, Apex of maxilla 1; D, Maxilla 1; E, Apex of distal segment of mandibular palp; F, Mandibular palp; G, Distal lobes of maxilla 2; H, Maxilla 2; I, Scales on maxilla 2; J, Apex of body of mandible; K, Body of mandible; L, Apex of palp of maxilliped; M, Seta from margin of maxilliped; N, Maxilliped. Mouthparts 29×, enlarged details of mouthparts 363×. Scale in mm.

Penis lobes of male separate. Appendix masculina of male pleopod 2 linear, with unmodified apex. Basis of pleopod 2 with 1 sensory and 4 coupling setae. Fifty-three females with oostegites were 18–28 long (mean 23); 8–13 wide (mean 10.6). Five females lacking oostegites were 22–26 long

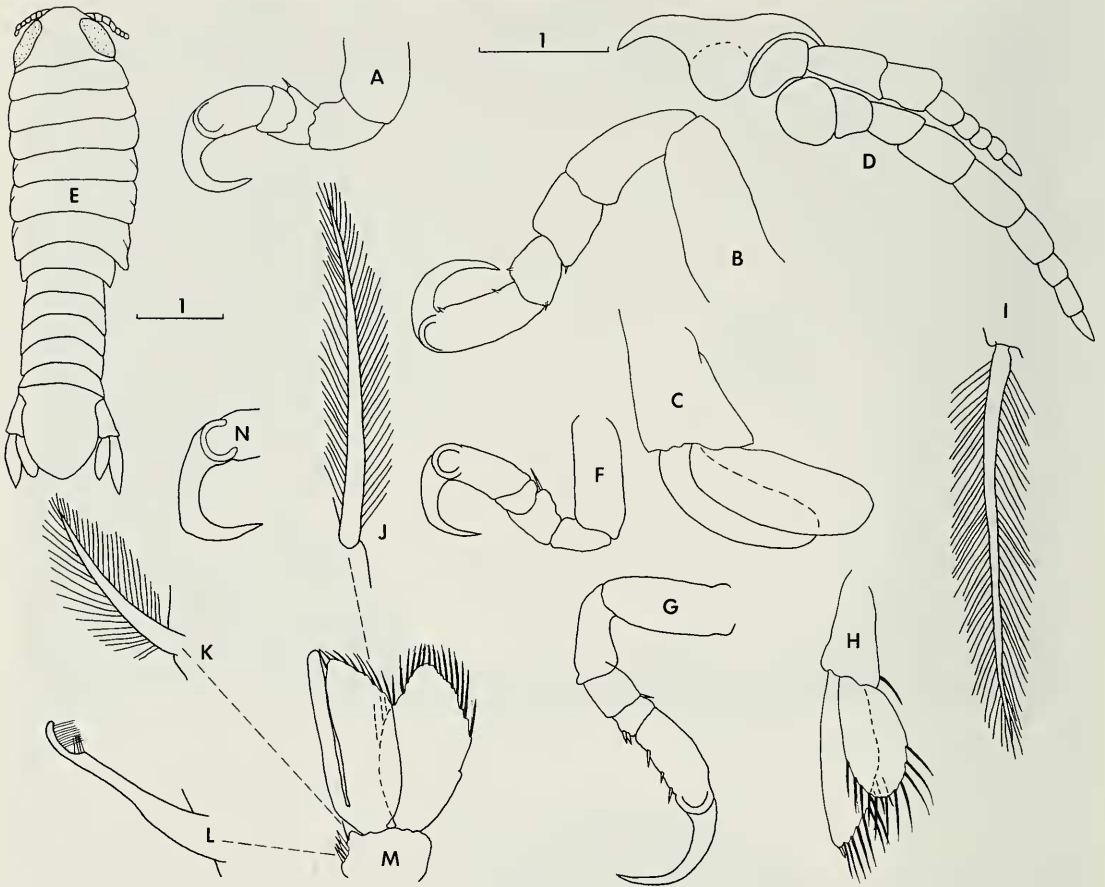


Fig. 25. *Anilocra chaetodontis*. A–D, ♀ with marsupium: A, Pereopod 1, 10×; B, Pereopod 7, 10×; C, Left uropod, 10×; D, Frons and left antennae. E–M, ♂: E, Dorsal view; F, Pereopod 1; G, Pereopod 6; H, Left uropod; I, Natatory seta from uropod; J, Seta from endopod of pleopod 2; K, Sensory seta from pleopod 2; L, Coupling seta from pleopod 2; M, Pleopod 2; N, Dactyl of a ♀ pereopod 2, 10×. ♂ Pereopods, uropod, and pleopod 44×, setae 371×. Scales in mm.

(mean 24.4); 10–12 wide (mean 11). Forty-one immature females were 7–25 long (mean 15.5); 3–12 wide (mean 6.3). Two transitionals were 6–8 long; 2 wide; penis lobes lacking or present; appendix masculina 67 to 75% length found in the male. Fourteen males were 4–5 long (mean 4.4); 1 wide; with pereopod 7 absent or reduced.

Remarks.—One hundred fifteen *Anilocra chaetodontis* were collected on 69 *Chaetodon capistratus*, length 47–94 (mean 73.4); 49 on 20 *Chaetodon striatus*, length 88–122 (mean 104.4); 10 on 4 *Chaetodon ocellatus*, length 68–126 (mean 103); 4 on 3 *Chaetodon sedentarius*, length 81–91 (mean 85). *Anilocra chaetodontis* attached in the subocular region (Fig. 22), but in one case, on a *Chaetodon striatus* with isopods attached below both eyes, a third was attached above the right eye (Great Inagua, Bahamas, 16 April 1977). Damage to the host varied from slight scale erosion to deep bone deformation (from the isopod attached above the eye).

The name is taken from the genus of the hosts.

Anilocra partiti, new species

Figs. 23, 26, 27D

Isopods examined.—13 (6 females with a marsupium, 2 females without a marsupium, 3 immature females, and 2 transitionals).

Type-host and locality (date).—Bicolor damselfish, *Pomacentrus partitus* Poey, Discovery Bay, Jamaica (7–9 January 1980).

Location.—Attached beneath eye of the host (Fig. 23).

Type-specimens.—Holotype (female) USNM # 184833; 5 paratypes USNM # 184834–184837.

Additional localities (date).—Jamaica, Río Bueno (10–11 January 1980).

Diagnosis.—Anterior margin of head truncate, flexed and produced into lobe between bases of antennae 1. Posteroventral angle of pereonite 7 slightly produced, that of pereonite 7 overlapping pleonite 1. Shortest pereonite 2, longest 6. Body axis distorted less than 5°. Telson $\frac{1}{20}$ to $\frac{1}{6}$ wider than long. Pereopods 2–4 with swelling on outer margin of dactyl. Dactylus of pereopod 7 longer than propodus. Uropod not reaching posterior margin of telson. Endopod of uropod not reaching posterior end of exopod.

Further details.—Body expanded oval, length-width ratio 2.0 (1.7–2.2). Head width-length ratio 2.4 (2.1–3.1). Antennae 1 8-merous. Antennae 2 9–10-merous, reaching from almost to posterior edge to beyond posterior edge of pereonite 1. Interocular distance 59% (50–69%) of head width. Distal segment of mandibular palp with 4–7 simple setae, second segment with or without setae. Pleotelson broadly rounded. Color of dorsal and ventral surfaces of body and pereopods black to slate gray in life. Six females with oostegites were 12–16 long (mean 13.7); 5.5–7.4 wide (mean 6.9). Two females lacking oostegites were 12.0–13.5 long; 6.0–6.5 wide. Three immature females were 8.3–12.0 long (mean 9.7); 3.7–4.5 wide (mean 4). Two transitionals were 7.6–9.0 long; 3.2–4.0 wide; lacking penis lobes; appendix masculina 25% length probably found in male.

Remarks.—These parasites were collected from 11 *Pomacentrus partitus*, length 31–51 (mean 43.2). Some erosion of scales occurred in the area of isopod attachment.

The name is taken from the specific epithet of the host.

Anilocra laevis Miers, 1877

Anilocra laevis Miers, 1877:672–673, pl. 68, fig. 6; Gerstaecker, 1901:264–265.

Isopods examined.—1 female syntype of *Anilocra laevis* 1879-21 (BMNH).

Type-host.—Unknown.

Type-locality.—Martinique and Peru.

Type-specimens.—“a specimen from each locality (Martinique and Peru) is in the collection” (BMNH) (Miers 1877).

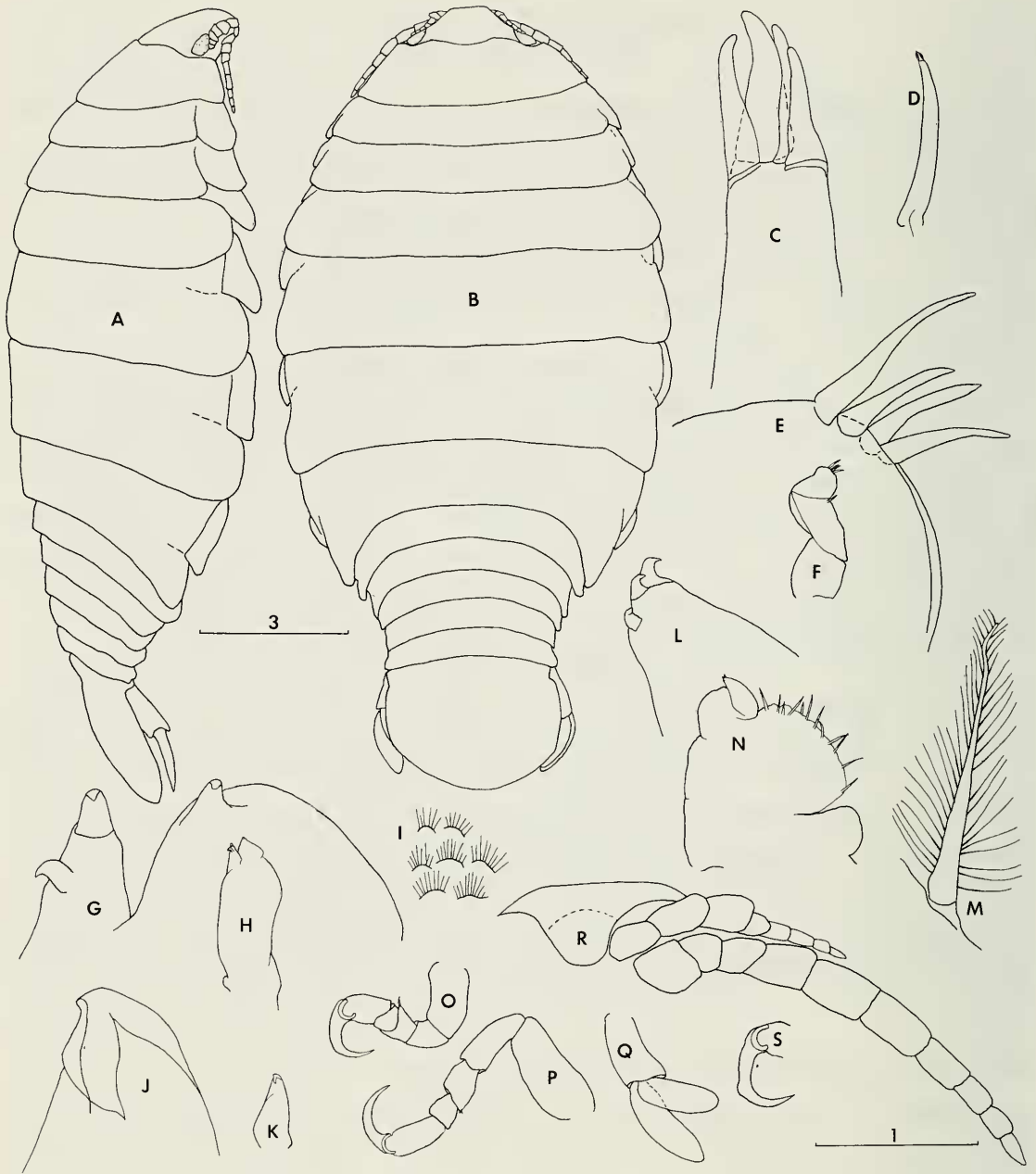


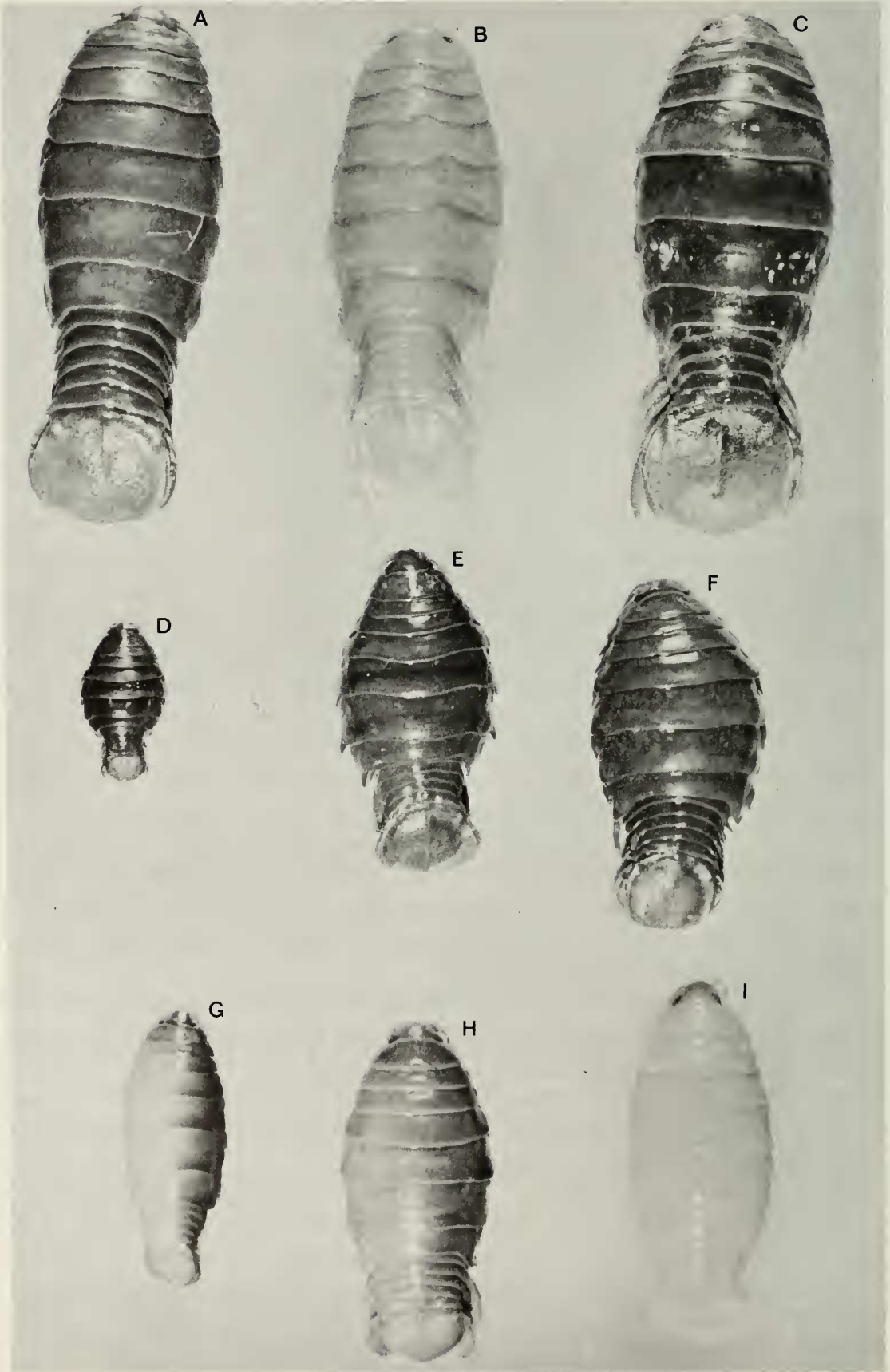
Fig. 26. *Anilocra partiti*, ♀ with marsupium: A, Lateral view; B, Dorsal view; C, Apex of maxilla 1; D, Maxilla 1; E, Apex of distal segment of mandibular palp; F, Mandibular palp; G, Distal lobes of maxilla 2; H, Maxilla 2; I, Scales on maxilla 2; J, Apex of body of mandible; K, Body of mandible; L, Apex of palp of maxilliped; M, Seta from margin of maxilliped; N, Maxilliped; O, Pereopod 1; P, Pereopod 7; Q, Left uropod; R, Frons and left antennae; S, Dactyl of pereopod 2. Mouthparts 29×, enlarged details of mouthparts 363×, pereopods and uropod 10×. Scales in mm.

Remarks.—The syntype of *A. laevis* from Peru is missing; only the syntype from Martinique remains in the British Museum of Natural History (Joan P. Ellis, pers. comm.). Miers (1877) provided measurements; illustrations of the dorsal view of the entire isopod, ventral view of frons and

antennae, pereopod 7, and uropod; and a description for *A. laevis*. The measurements of the specimen of syntype (length 41.0; width 15.0) do not precisely correspond to the original measurement (length 40.2; width 15.9). The length-width ratio of the syntype (2.73) does not correspond to the length-width ratio of the measurements (2.53) or the ratio taken from the original figure (2.55). The dorsal view of Miers (1877, Pl. LXVIII, Fig. 6) does not correspond to the dorsal view of the syntype. The telson is wider than long in the syntype, but as long as wide in the figure and the width of pleonite 5 of the figure is approximately $\frac{3}{4}$ the length of the telson, but in the syntype this width is equal to the length of the telson. Because Miers (1877) illustrated light-shaded (Pl. LXIX, Fig. 4) and dark-shaded (Pl. LXIX, Fig. 5) isopods, and the illustration of *A. laevis* (Pl. LXVIII, Fig. 6) was dark-shaded, the figure must represent a dark-colored isopod. The syntype, however, is not dark, but light yellow in color. The illustration of the frons and antennae (Pl. LXVIII, Fig. 6a) do not agree with the syntype, because the bases of antennae 1 are covered by the frons in the illustration, but exposed on the syntype; and the frons extends posteriorly beyond the bases of antennae 2 in the figure, but only between the bases of antennae 1 in the syntype. Pereopod 7 (Pl. LXVIII, Fig. 6b) is not the same in the figure, where the merus is shorter than the carpus, and the syntype, where the merus is longer than the carpus. The uropods of the figure (Pl. LXVIII, Fig. 6c) and the syntype vary in the width of the basis. Twice the greatest width of the basis is approximately equal to the length of the exopod in the figure, but much less than the length of the exopod in the syntype. The description disagrees with the syntype by the posteroventral angle of pereonite 7 being broad, obtuse, and rounded instead of narrow, acute, and pointed; coxae 4 being obtuse, instead of acutely pointed posteriorly; bases of antennae 1 covered by the frons, instead of exposed; posteroventral angle of pereonite 6 not produced (posterior margins straight), instead of slightly produced; posterior margin of telson rounded, instead of obtuse pointed; and antennae 2 being 9-merous instead of 10-merous.

The length-width ratios and illustrations for *A. laevis* do not correspond with the remaining syntype, and many of the characters found in the description disagree with the syntype. Obviously *A. laevis* was not described from the syntype from Martinique, but from the syntype from Peru. Also, the 2 specimens represent 2 distinct species: *Anilocra laevis* from Peru, and *Anilocra haemuli* from Martinique.

Anilocra laevis may be distinguished from *A. haemuli* by having the bases of antennae 1 covered by the frons; a frons which extends posterior of the bases of antennae 2, instead of between the bases of antennae 1; posteroventral angle of pereonite 7 broad, obtuse and rounded, instead of acutely pointed; posterior margin of telson rounded, instead of obtusely pointed; coxae 4 obtuse, instead of acutely pointed posteriorly; and body darkly colored, instead of yellow to light brown in color.



Anilocra laticauda Milne Edwards, 1840, nomen dubium

Anilocra laticauda Milne Edwards, 1840:259.

Type-host.—Unknown.

Type-locality.—Carribbean Sea ("la mer des Antilles").

Type-specimens.—Unknown.

Description.—Antennae 1 not nearly reaching posterior margin of head. Coxae 6 and 7 weakly pointed posteriorly. Pleotelson very large, expanded near midlength, notably wider than pleonite 5, rounded posteriorly. Uropod rami oval, inner same size as outer or smaller. Length about 14 lines (translation of original description in French).

Remarks.—The above paragraph is all that was given in the original description to identify a species described as *Anilocra laticauda* by Milne Edwards in 1840. The locality could apply to any of the 9 species described in the present work. The antennae length noted could apply to individual specimens in any of these 9 species. Depending on how the terms "weakly pointed" are interpreted, coxae 6 and 7 of individual specimens in any of 5 to 9 of these species could be so described. Individual specimens of all but 1 of these 9 species possess a pleotelson which is expanded near midlength, notably wider than pleonite 5, and rounded posteriorly. The uropod relationship in the original description could apply to individuals in any of 6 of these species. The length stated above falls approximately within the size ranges of 8 of these species. With no original illustration, no precise locality, and a very limited original description, the isopod described as *A. laticauda* cannot be identified. To aid in determining this species, a search was made for possible undesignated type material and/or redescrptions based on the original material of Milne Edwards (1840).

Two lots of specimens from the Muséum National d'Histoire Naturelle in Paris could have possibly been the type for *A. laticauda*, IS-492 and IS-294. Neither vial contained the printed label typical of the holotypes of H. Milne Edwards (J. Forest, pers. comm.). IS-492 contained 1 specimen of *A. haemuli* and 1 of *A. acanthuri*. The original description of *A. laticauda* lists the measurements for only a single specimen. Also, the original length 29.6 mm (14 lines), is much shorter than the length of either of these specimens, 34.5 and 36.5 mm. IS-492 contained a single specimen of *Anilocra haemuli* 32 mm in length. Trilles (1975) suggested that this specimen is much closer to the original length reported for *A. laticauda* and is more

←

Fig. 27. New species of *Anilocra*, ♀ with marsupia: A, *A. acanthuri*; B, *A. myripristis*; C, *A. holocentri*; D, *A. partiti*; E, *A. chaetodontis*; F, *A. holacanthi*; G, *A. chromis*; H, *A. abudehdufi*; I, *A. haemuli*. All 1.8×.

likely to represent the original type. *Anilocra laticauda* was originally described (above) with inner uropod rami (endopods) the same size or smaller, than the outer rami (exopods). However, the endopods are longer than the exopods in this specimen. Therefore, this specimen cannot be considered the type for *A. laticauda*. Neither lot IS-492 or 294, could possibly represent the original type for *A. laticauda*.

Anilocra laticauda has been redescribed seven times (Schioedte and Meinert 1881; Moore 1902; Richardson 1905; Nierstrasz 1915; Boone 1930; Bowman and Díaz-Ungría 1957; and Menzies and Glynn 1968). However, none of these redescriptions are based on the original material of Milne-Edwards. Schioedte and Meinert (1881) apparently did not use the original material of Milne Edwards in their redescription. They cite 9 localities, ranging from Maryland, U.S.A., through the Caribbean, and to the Straits of Magellan, for *A. laticauda*. From these specimens collected from a variety of widespread locations, and probably representing a variety of species, a female was selected which was described as yellow in color. *Anilocra haemuli* is the only species in the present work which could be described as yellow in color. The description and illustrations of *A. laticauda* by Schioedte and Meinert also closely agree with *A. haemuli*. Ironically, *A. haemuli* is one of the few species described in the present work which does not conform to the original description of *A. laticauda*. The endopod of the uropod of *A. laticauda* is equal to or shorter than the exopod; in *A. haemuli* the endopod is always longer than the exopod. The endopods and exopods described and illustrated for *A. laticauda* by Schioedte and Meinert (1881) conform to the description of *A. haemuli*, not to the original description of *A. laticauda*. Moore (1902) redescribed *A. laticauda* from 1 specimen of *A. holocentri* (USNM 32655) and 1 specimen of *A. chaetodontis* (USNM #985) collected in Puerto Rico. Richardson (1905) apparently used Moore's specimen of *A. holocentri* from the U.S. National Museum (Moore specimen: 35.5×14 ; Richardson specimen 36×14) in her redescription of *A. laticauda*. Richardson (1905) employed the drawings of *A. haemuli* from Schioedte and Meinert (1881) along with line drawings of mouthparts and pereopod 7 possibly from Moore's specimen of *A. holocentri*. Nierstrasz (1915) redescribed *A. laticauda* from 1 ovigerous female of *A. haemuli* (Nierstrasz, 1915, Fig. 7 and 8) and a male from St. Thomas, U.S.V.I., and a juvenile specimen from Venezuela. Boone (1930) redescribed *A. laticauda* from what was possibly a specimen of *A. holacanthi*. Bowman and Díaz-Ungría (1957) provided a short diagnosis of *A. laticauda* from a specimen of *A. haemuli* from Venezuela. Menzies and Glynn (1968) redescribed *A. laticauda* from a specimen of *A. holocentri* from Puerto Rico. The redescriptions of *A. laticauda* were based on different species of *Anilocra* and some were based on more than 1 species of *Anilocra*. The redescriptions of *A. laticauda* are of no value in determining the identity of the species originally described as *Anilocra laticauda*.

Table 1.—Characters distinguishing the species of *Anilocra* known from the Caribbean Sea.

Species:	<i>haemuli</i>	<i>holocentri</i>	<i>myripristis</i>	<i>acanthuri</i>	<i>chromis</i>	<i>abudofdufi</i>	<i>holacanthi*</i>	<i>chaetodontis</i>	<i>paritii†</i>
Uropod reaching posterior margin of telson	no	no	yes	no	yes	yes/no	no	no	no
Endopod of uropod extending beyond posterior end of exopod	yes	yes	yes	yes/no	no	yes/no	yes	yes	no
Posterior ventral angle(s) slightly produced in pereonite(s)	6	7	6	—	—	6	5,6	4	7
Posterior ventral angle(s) produced in pereonite(s)	7	—	7	—	—	7	7	5,6,7	—
Posterior ventral angle of pereonite 7 overlapping pleonite(s)	1	1	1	—	—	1	1	2	1
Pereopods 2–4 with swelling on outer margin of dactyl	no	no	no	no	no	yes	yes	yes	yes
Length of females with a marsupium (mm)	≥21 (21–40)	≥32 (32–46)	≥29 (29–40)	≥29 (29–40)	≥16 ≤28 (16–28)	≥19 ≤31 (19–31)	≥21 (21–33)	≥18 ≤28 (18–28)	≤16 (12–16)
Color, dorsal surface of female	yellow to light brown	dark brown	light reddish brown	black to lead-gray	dark-gray and off-white	dark brown and light brown	black to lead-gray	black to lead-gray	black to slate-gray
Location on host	under eye	between eyes	between eyes	under pectoral fin	under eye	under eye	under eye	under eye	under eye

* Body axis distorted more than 10°, all other species in the table with body axis distorted less than 5°.

† Dactylus of pereopod 7 longer than propodus, all other species in the table with dactylus of pereopod 7 shorter than propodus.

The surviving evidence is too meager ever to determine what the name "*Anilocra laticauda*" was intended to designate. Beginning with Schioedte and Meinert (1881), the name has been variously misused for 100 years. The name "*Anilocra laticauda*" should not be salvaged; it is declared a nomen dubium, and should be dropped from usage.

Anilocra leachii Schioedte, 1866, nomen dubium

Anilocra leachii Schioedte, 1866:205, pl. 11, fig. 2; Schioedte, 1868:12, pl. 1, fig. 5.

Type-host.—Unknown.

Type-locality.—West Indies.

Type-specimen.—Unknown.

Description.—Unknown.

Remarks.—Schioedte (1866) labelled seven drawings of the mouthparts of an isopod "*Anilocra leachii*, Kr." No description or additional figures were provided. Schioedte (1868) noted *A. leachii* was very close to *A. laticauda*. The drawing of mouthparts should not constitute a description of a species. Furthermore, the illustration without additional figures, description, locality, or type-series is insufficient information to allow identification of the species of *Anilocra*. The name *Anilocra leachii* should be considered a nomen dubium.

Discussion

Anilocra of Caribbean fishes has been generally considered a single species over the past 140 years. This stability suggests that any species separated from the "*Anilocra laticauda* complex" must be morphologically very similar. Actually these species are morphologically diverse (Fig. 27). The survival of "*Anilocra laticauda* complex" was ensured by the combination of characters included in redescriptions based on different and multiple species of *Anilocra*.

Host specificity and location of adult females are very consistent in the 9 species of *Anilocra* described. Eight of the species are limited to 1 species or 1 genus of hosts, while 1 species infests 3 genera of hosts in 2 families. Only 4 adult female isopods were observed in abnormal positions on the host (as discussed in the species remarks) in more than 800 hosts which were collected and many thousands of hosts which were observed in the field.

Acknowledgments

Thanks are expressed to Dr. Thomas E. Bowman, Smithsonian Institution, for suggestions and advice concerning this work and review of the manuscript; Dr. Bowman and Dr. Brian Kensley, Smithsonian Institution,

Dr. C. R. Robins and Dr. Gilbert Voss, RSMAS, University of Miami, Dr. J. Forest, Museum National d'Histoire Naturelle, Paris, Drs. C. E. Dawson and Robin M. Overstreet, Gulf Coast Research Laboratory, Ms. Carol Sanner, Ms. Joan P. Ellis, British Museum of Natural History, Dr. Peter Glynn and Dr. John Cubit, Smithsonian Tropical Research Institute, Panama, Dr. W. A. Courtenay, Jr., Florida Atlantic University, Dr. Charlotte Holmquist, Naturhistoriska Riksmuseet, Ms. Catharine Kessler, Museum of Comparative Zoology, Harvard, Dr. Hans-Eckard Gruner, Zoologisches Museum an der Humbolt-Universitat zu Berlin, and Dr. Jozef Vlachovic, Slovenske Narodne Muzeum, Czechoslovakia for collecting or loaning specimens; Professor Charles E. Cutress for suggestions and loan of equipment; Professor Walter F. Hendrick for technical assistance and training for underwater work; A. Charles Arneson for advice concerning underwater photography; Dr. Joseph R. Sullivan, Alaska Department of Fish and Game, for aid in translations; and Mr. Herb Taylor for one of the underwater photographs.

Thanks are extended to Michael J. Dowgiallo, Dr. Raymond E. Waldner, A. Charles Arneson, Dr. David L. Ballantine, Dr. Patrick L. Colin, Deborah A. Weiler, Ileana E. Clavijo, Tracey J. Wolfe, Thomas Morgan, Dr. Friedman Koster, and Adolphus G. Bunkley for help in collecting hosts; Dr. Colin for making the 1976-1977 Bahamas collections possible; The Sea Education Association, Woods Hole, Mass., and especially Captain John Lucas, for making the British Virgin Island collections possible; and Mr. Bob Bernhard and Mr. Marlin Fitch for making the Culebra Island collections possible. Support was provided in part by grant number 8852 from the American Philosophical Society; mission No. 79-4 from the National Oceanic and Atmospheric Administration, Hydrolab Habitat Project; and a grant from the President of the University of Puerto Rico, Dr. Ismael Almodóvar. Laboratory and field equipment and assistance was provided by Instituto de Investigaciones de Punta de Betin, Colombia; Centro de Investigaciones de Biología Marina, Dominican Republic, and Discovery Bay and Port Royal Marine Laboratories, Jamaica; in cooperation with the Association of Island Marine Laboratories of the Caribbean.

Literature Cited

- Böhlke, J. E., and C. C. G. Chaplin. 1968. Fishes of the Bahamas and adjacent tropical waters.—The Academy of Natural Sciences of Philadelphia, Livingston Publishing Company, Wynnewood, Pennsylvania, 771 pp.
- Boone, P. L. 1921. Report on the Taniidacea and Isopoda collected by the Barbados-Antiqua Expedition from the University of Iowa in 1918,—Studies in Natural History, University of Iowa 9(5):91-98.
- . 1927. Scientific results of the first oceanographic expedition of the "Pawnee" 1925: Crustacea from tropical east American seas.—Bulletin of the Bingham Oceanographic Collection 1(2):1-147.
- . 1930. Crustacea. *In* Scientific results of the cruises of the yachts "Eagle" and "Ara",

- 1921–1928, William K. Vanderbilt, commanding.—Bulletin of the Vanderbilt Marine Museum 3:1-221.
- Bowman, T. E., and C. Díaz-Ungría. 1957. Isopodos quimotoideos parásitos de peces de las aguas Venezolanas.—Sociedad de Ciencias Naturales La Salle Memoria 17(47):112–124.
- , S. A. Grabe, and J. H. Hecht. 1977. Range extension and new hosts for the cymothoid isopod *Anilocra acuta*.—Chesapeake Science 18(4):390–393.
- Burnett-Herkes, J. 1975. Contribution to the biology of the red hind, *Epinephelus guttatus*, a commercially important serranid fish from the tropical western Atlantic.—Dissertation, University of Miami, Miami, Florida.
- Chess, T. 1975. (Cover photograph).—Underwater Naturalist, Bulletin of the American Littoral Society 10(1):1.
- Colin, P. L. 1978. Caribbean reef invertebrates and plants.—Tropical Fish Hobbyist Publications, Inc., Neptune City, New Jersey, 512 pp.
- Collette, B. B., and F. H. Talbot. 1972. Activity patterns of coral reef fishes with emphasis on nocturnal-diurnal changeover. In B. B. Collette and S. A. Earle, Eds. Results of the Tektite Program: Ecology of coral reef fishes.—Natural History Museum of Los Angeles County Science Bulletin 14:98–124.
- Dowgiallo, M. J. 1979. Variation of metazoan parasites of the French grunt, *Haemulon flavolineatum* (Desmarest) (Osteichthyes: Pomadasyidae), by habitat type and season with an analysis of competition among parasites.—Masters thesis, University of Puerto Rico, Mayaguez, Puerto Rico.
- Gerstaecker, A. 1901. Isopoda. In Die Klassen und Ordnungen der Arthropoden wissenschaftlich dargestellt in Wort und Bild, Ed. H. G. Bronn. Funfter Band, II Abtheilung, Crustacea (Zweite Hälfte: Malacostraca):2–278.
- Hochberg, F. G., Jr., and R. J. Ellis. 1972. Cymothoid isopods associated with reef fishes. In B. B. Collette and S. A. Earle, Eds. Results of the Tektite program: Ecology of coral reef fishes.—Natural History Museum of Los Angeles County Science Bulletin 14:84 (abstract).
- Menzies, R. J., and P. W. Glynn. 1968. The common marine isopod Crustacea of Puerto Rico.—Studies on the fauna of Caraçao and other Caribbean Islands 27(104):1–133.
- Miers, E. J. 1877. On a collection of Crustacea, Decapoda and Isopoda chiefly from South America, with descriptions of new genera and species.—Proceedings of the Zoological Society of London 43:653–679.
- Milne Edwards, H. 1840. Histoire naturelle des Crustacés 3:1–605.
- Moore, H. F. 1902. Report on Porto Rican Isopoda.—Bulletin of the United States Fisheries Commission 20(2):161–176.
- Nierstrasz, H. F. 1915. Die Isopoden-Sammlung im Naturhistorischen Reichs-Museum zu Leiden. I. Cymothoidae.—Zoologische Mededeelingen 1:71–108.
- Richardson, H. 1905. A monograph on the isopods of North America.—United States National Museum Bulletin 54:1–727.
- . 1912. Marine and terrestrial isopods from Jamaica.—Proceedings of the United States National Museum 42:187–194.
- Schioedte, J. C. 1866. Krebsdyrenes Sugemund.—Naturhistorisk Tidsskrift (3)4:169–206, pls. 10–11.
- . 1868. On the structure of the mouth in sucking crustacea. Part I. Cymothoae.—Annals and Magazine of Natural History (4)1:1–25, pl. 1.
- , and F. Meinert. 1881. Symbolae ad monographiam Cymothoarum Crustaceorum Isopodum Familiae. II. Anilocridae.—Naturhistorisk Tidsskrift (3)13:1–166, pls. 1–10.
- Smith, C. L., and J. C. Tyler. 1972. Space resource sharing in a coral reef fish community. In B. B. Collette and S. A. Earle, Eds., Results of the Tektite Program: Ecology of coral reef fishes.—Natural History Museum of Los Angeles County Science Bulletin 14:125–170.

- Trilles, J. P. 1975. Les Cymothoidae (Isopoda, Flabellifera) des collections du Muséum National d'Histoire naturelle de Paris. II. Les Anilocridae Schioedte et Meinert, 1881. Genres *Anilocra* Leach, 1818 et *Nerocila* Leach, 1818.—Bulletin du Muséum National d'Histoire Naturelle (3)290, Zoologie 200:303–346.
- , and J. C. Vala. 1975. Sur trois espèces de Cymothoidae de la Guadeloupe.—Bulletin du Muséum National d'Histoire Naturelle (3)318, Zoologie 225:967–976.
- Wallin, D. 1978. Togetherness underwater.—Sea Frontiers 24(1):47–54.
- Williams, E. H., Jr., and L. B. Williams. 1977. Isopod parasites of some marine fishes from Puerto Rico and adjacent areas.—Proceedings of the Association of Island Marine Laboratories of the Caribbean 13:14.
- Williams, L. B., and E. H. Williams, Jr. 1977. Isopods of the genus *Anilocra*, parasites of some West Indian fishes.—Proceedings of the Association of Island Marine Laboratories of the Caribbean 13:15.
- , and ———. 1978. The ability of various West Indian cleaners to remove parasitic isopod juveniles of the genus *Anilocra*: A preliminary report.—Proceedings of the Association of Island Marine Laboratories of the Caribbean 14:28.

University of Puerto Rico, Department of Marine Sciences, Mayaguez,
Puerto Rico 00708.